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MODEL 806

HETERODYNE CONVE

SYSTRON DONNER

FAIREY ELECTRONICS LTD.
BARNSTAPLE, ENGLAND.

OPERATING AND SERVICE MANUAL

MODEL 806

HETERODYNE CONVERTER

S/N 010169 and after

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SYSTRON-DONNER CORP.
ONE SYSTRON DRIVE
CONCORD, CALIFORNIA
USA 94518

MODEL 806

HETERODYNE CONVERTER

Printed December 1973

WARRANTY

The Systron-Donner Model 806 Heterodyne Converter was in perfect working order at the time of shipment. Upon receipt, the unit should be carefully inspected. If the unit is damaged in any way, or fails to operate properly, a claim should immediately be filed with the shipping company.

The unit is warranted 1 year from date of shipment to the original purchaser to be free from defects in material and workmanhsip. This warranty does not apply to vacuum tubes, except as they are warranted by the tube manufacturer.

The liability of Systron-Donner under the warranty is limited to replacing or repairing any instrument or component thereof which is returned by the purchaser at his expense during the warranty period, provided that the unit has not been subjected to misuse, neglect, accident, or improper installation, repair, or alteration. Systron-Donner has the right of final determination as to the existence and cause of a defect.

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SYSTRON-DONNER MANUAL CHANGES

MODEL 806

HETERODYNE CONVERTER

Serial Numbers * 010169 and after
Manual Printed December 1973

Make all corrections in the manual according to the errata shown below. Check the table for your instrument serial number to determine effectivity.

Change Number	Effective on Serial Number	Change Number	Effective on Serial Number

Change Number Date Errata

* Serial number format
01 01 71
Unit Month Year

TECHNICAL MANUAL COVERAGE

The spectrum analyzer system is supplied in various configurations, and is provided with suitable technical manual(s) containing operating and maintenance instructions, with illustrated parts list.

Users of the spectrum analyzer will find their applicable publications consisting of organized chapters covering the particular configurations supplied.

Note that the absence of certain numbered chapters does not necessarily imply that the user's specific data coverage as provided is incomplete.

TABLE OF CONTENTS

Section			Page
	CHAPTER 3 MODEL 806 CONVERTER		
I	DESCRIPTION		
	3-1.	Purpose and Function	3-1
	3-3.	Performance Characteristics	3-1
	3-5.	External Power Requirements	3-1
	3-6.	Calibration	3-1
	3-7.	Input Impedance	3-2
	3-8.	Output Connections	3-2
	3-9.	Equipment Supplied	3-2
	3-11.	Equipment Required But Not Supplied	3-2
	3-13.	Tools and Test Equipment	3-2
	3-15.	Storage Requirements	3-2
II	PREPARATION FOR USE		
	3-17.	Unpacking and Inspection	3-7
	3-19.	Mounting	3-7
	3-21.	Rear Panel Connections	3-7
	3-23.	Set-Up Procedure	3-8
III	GENERAL THEORY OF OPERATION		
	3-25.	Overall Functional Description	3-9
	3-31.	Detailed Circuit Description	3-12
	3-33.	Input Circuits	3-12
	3-34.	First Mixer, AGC Circuits	3-13
	3-35.	Master Oscillator	3-13
	3-36.	Doubler Divider	3-13
	3-44.	500 kHz Filter	3-15
	3-45.	Second Mixer	3-15
	3-48.	240 kHz Filter	3-16
	3-49.	Self-Test Board	3-17
IV	OPERATING INSTRUCTIONS		
	3-52.	Scope	3-19
	3-54.	Front Panel Controls and Indicators	3-19

TABLE OF CONTENTS (Continued)

Section			Page
	3-56.	Self-Test Calibration Procedure	3-19
	3-58.	Signal Analysis Procedure	3-24
V	MAINTENANCE		
	3-63.	General	3-27
	3-65.	Test Equipment	3-27
	3-67	Preventive Maintenance	3-27
		3-68. Inspection	3-27
		3-69. Cleaning	3-27
		3-70. Lubrication	3-28
		3-71. Performance Tests	3-28
		3-72. Calibration	3-28
	3-73.	Troubleshooting	3-28
		3-76. Preliminary Troubleshooting Checks	3-29
		3-77. Isolating the Fault to the Unit Level	3-29
		3-79. Detailed Troubleshooting	3-30
	3-80.	Repair and Replacement	3-30
	3-82.	Performance Checks	3-30
		3-85. Response Flatness and Frequency Range	3-34
		3-90. Tuning Head Frequency Accuracy	3-37
		3-95. Tuning Head Stability	3-38
		3-100. Image Rejection	3-39
		3-105. Sensitivity	3-41
		3-110. Dynamic Range (Intermodulation Distortion)	3-44
		3-115. Input Attenuator Accuracy	3-45
	3-120.	Calibration	3-47
		3-123. 500 kHz Filter Adjustment	3-54
		3-125. 240 kHz Filter Adjustment	3-56
		3-127. 5 kHz Oscillator Adjustment	3-58
		3-129. 500 kHz Oscillator Adjustment	3-58
		3-131. 3.000/3.002 mHz Oscillator Adjustment	3-59
		3-133. Second Local Oscillator Level Adjustment	3-59
		3-135. Second Local Oscillator Filter Adjustment	3-59
		3-137. 740 kHz Crystal Oscillator Adjustment	3-60
		3-139. 740 kHz Center Frequency Adjustment	3-61
		3-141. 100 kHz Scan Width Adjustment	3-61
		3-143. AGC Level Adjustment	3-61
		3-145. Master Oscillator Adjustment	3-61
		3-147. Doubler Divider Adjustment	3-62
		3-149. Signal Gain Adjustment	3-63

TABLE OF CONTENTS (continued)

Section			Page
VI	PARTS LIST		
	3-151.	Introduction	3-81
	3-153.	Column Headings	3-81
	3-160.	Vendor Codes	3-82

LIST OF ILLUSTRATIONS

Figure		Page
	MODEL 806 CONVERTER	
3-1.	Model 806 Converter	3-vi
3-2.	Outline and Dimensional Drawing	3-6
3-3.	Simplified Block Diagram, Converter	3-10
3-4.	Block Diagram, First Local Oscillator Circuitry, Doubler Divider	3-11
3-5.	Front Panel Controls and Indicators	3-20
3-6.	500 kHz + 5 kHz Calibration Check	3-25
3-7.	Intermodulation Check Display	3-25
3-8.	Model 806 Converter, Components and Adjustments	3-32
3-9.	Response Flatness and Frequency Range Test Setup	3-36
3-10.	Tuning Head Frequency Accuracy and Stability Test Setup	3-36
3-11.	Image Rejection Test Setup	3-42
3-12.	Sensitivity Test Setup	3-42
3-13.	Input Attenuator Accuracy Test Setup	3-48
3-14.	500 kHz Filter Adjustment Setup	3-55
3-15.	240 kHz Filter Adjustment Setup	3-57
3-16.	806 Converter Schematic	3-65
3-17.	AT301 Input Attenuator Schematic	3-67
3-18.	First Mixer-AGC Schematic	3-69
3-19.	A301 Master Oscillator and A302 Doubler Divider Schematic	3-71
3-20.	500 kHz Filter Schematic	3-73
3-21.	Second Mixer Schematic	3-75
3-22.	240 kHz Filter Schematic	3-77
3-23.	Self-Test Board Schematic	3-79
3-24.	Converter Assembly	3-86
3-25.	Master Oscillator Assembly	3-89
3-26.	Doubler Divider Assembly	3-93
3-27.	Front Panel Assembly	3-104
3-28.	Doubler Divider Switch Assembly	3-108
3-29.	Attenuator Assembly	3-110

LIST OF TABLES

Table No. Page

CHAPTER 3
MODEL 806 CONVERTER

3-1.	Specifications and Performance Data	3-3
3-2.	Tools and Test Equipment List	3-5
3-3.	Front Panel Controls and Indicators	3-21
3-4.	Performance Check Record Form	3-49
3-5.	Converter Adjustments	3-53
3-6.	Converter Assembly, Parts List	3-87
3-7.	Master Oscillator Assembly, Parts List	3-91
3-8.	Doubler Divider Assembly, Parts List	3-95
3-9.	Self-Test Board Assembly, Parts List	3-97
3-10.	740 kHz Oscillator Board Assembly, Parts List	3-99
3-11.	240 kHz Filter Board Assembly, Parts List	3-101
3-12.	500 kHz Filter Board Assembly, Parts List	3-102
3-13.	Mixer-AGC Board Assembly, Parts List	3-103
3-14.	Front Panel Assembly, Parts List	3-105
3-15.	Master Oscillator and Doubler Divider Circuit Boards, Parts List	3-106
3-16.	Doubler Divider Switch Assembly, Parts List	3-109
3-17.	Attenuator Assembly, Parts List	3-111

Figure 3-1. Model 806 Converter

CHAPTER 3
MODEL 806 CONVERTER

SECTION I
DESCRIPTION

3-1. PURPOSE AND FUNCTION. (figure 3-1)

3-2. The Model 806 Converter, hereinafter referred to as the converter, consists of a highly stable, tunable, variable frequency oscillator and mixer with following intermediate frequency stages and filters, assembled in a self-contained unit. When used with the Model 710B/800B Spectrum Analyzer, the converter translates signals from the high frequency region into a nominal 240 kHz IF signal for processing in the spectrum analyzer. The converter is normally mounted atop the spectrum analyzer proper to extend the range of the instrument into the high frequency spectrum.

3-3. PERFORMANCE CHARACTERISTICS. (table 3-1)

3-4. The converter's frequency range is divided into seven bands, selected by a band select switch and a rotating drum dial readout, covering 10 Hz to 64 mHz. The frequency tune mechanism has a course-fine adjustment for rapid setting of frequencies. An attenuator with eight toggle switches provides up to 72 db attenuation in 1 db steps, with an accuracy of 0.05 db per db. The first local oscillator output is available on the rear panel for accurate determination of center frequency with an external counter.

3-5. EXTERNAL POWER REQUIREMENTS. A connector on the rear panel accepts regulated dc voltages required for operation of the converter. These voltages normally are provided from the display unit of the spectrum analyzer.

3-6. CALIBRATION. An internal calibrate signal of 500 kHz stable frequency is used to center the signal on the display, providing a signal exactly 500 kHz below the local

oscillator output signal. The calibrate signal has available a 5 kHz modulation which generates markers out to at least 100 kHz for calibrating the scan width. A two tone signal, consisting of 3.000 and 3.002 mHz signals derived from crystal oscillators, is available for checking the frequency accuracy of the converter center frequency dial, as well as for checking intermodulation distortion of the spectrum analyzer system as a whole.

3-7. INPUT IMPEDANCE. A two-position slide switch permits selection of 50 ohms or 600 ohms of impedance applied to the input connector on the front panel.

3-8. OUTPUT CONNECTIONS. In addition to the rear panel local oscillator output connection, the front panel carries the IF output connector with toggle switch selecting zero or 20 db of attenuation. Also on the front panel is the connector for external use of the step attenuator.

3-9. EQUIPMENT SUPPLIED.

3-10. Model 806 Converter package contains only the item itself.

3-11. EQUIPMENT REQUIRED BUT NOT SUPPLIED.

3-12. Equipment necessary for connection, calibration, operation, and maintenance of the converter includes basic 710B/800B analyzer, Display Unit and Converter Interconnecting Cable, Part No. 36000-010, and Coax Cable, Part No. 36000-009.

3-13. TOOLS AND TEST EQUIPMENT.

3-14. Equipment required for maintenance and calibration of the converter is listed in table 3-2 together with the purpose of each item.

3-15. STORAGE REQUIREMENTS.

3-16. Store the converter under ambient conditions of -67° to 167° F (-54° to 75° C), relative humidity 0 to 95%, altitude 0 to 50,000 feet.

Table 3-1. Specifications and Performance Data

ITEM	PARAMETER	SPECIFICATION/PERFORMANCE
1	Power Requirements	+12 Vdc (Supplied from Model 710B - 6 Vdc Display Unit)
2	Center Frequency Range	10 Hz to 64 mHz (useable to 200 mHz with harmonic mixing)
3	Center Frequency Readout	
3A	Band Selector	Rotating slide rule drum, 7 positions Band 1: 0 - 500 kHz Band 2: 500 kHz - 1.5 mHz Band 3: 1.5 - 3.5 mHz Band 4: 3.5 - 7.5 mHz Band 5: 7.5 - 15.5 mHz Band 6: 15.5 - 31.5 mHz Band 7: 31.5 - 64 mHz
3B	Tuning	One knob provides combined coarse-fine tuning. Ultra-fine tuning available on Model 800B Plug-In Indicator from digital vernier covering 5 kHz adjustment with 20 Hz readout resolution at all frequencies
3C	Accuracy	±1% of dial reading ±5 kHz
4	First Local Oscillator Stability	At constant ambient temperature, after 30-minute warm-up, drift is less than 0.02 Hz/mHz/sec
5	Sensitivity	Frequency Range: 50 kHz to 40 mHz — Sensitivity - at least: -125 dbm for 100 Hz IF bandwidth Frequency Range: 40 mHz to 64 mHz — Sensitivity - at least: -110 dbm for 100 Hz bandwidth
6	Input Impedance	Switch selectable, 50 or 600 ohms

Table 3-1. Specifications and Performance Data (Cont)

ITEM	PARAMETER	SPECIFICATION/PERFORMANCE
7	Input Attenuators	72 db total in 1 db steps; 0.05db/db; 23 dbm max. input level.
7A	External Connector	Attenuator output bnc on front panel, for use with Model 800B or independently
8	Response Flatness	50 kHz to 40 mHz - ±1db 40 to 64 mHz - ±2db In Band Flatness - ±1/2db
9	Dynamic Range	All in band, odd order intermodulation products are down at least 70 db from a single tone level; harmonic distortion is down 70 db.
10	Calibrate Signals	500 kHz crystal oscillator for center frequency check
10A	Scan Width Calibrating	5 kHz modulation signal on the 500 kHz signal provides markers every 5 kHz out to 100 kHz
10B	Dial Calibrating	3.000 mHz and 3.002 mHz signals from two crystal oscillators also provide two tone intermodulation check of spectrum analyzer system
11	IF Attenuator	Switch selectable 0 or -20 db ±0.5 db
12	Local Oscillator Output	1st L.O. output bnc on rear panel; 50 mV rms
13	Image Rejection	Image at first IF, 500 kHz (located 480 kHz away) shall be at least 70 db down

Table 3-2. Tools and Test Equipment List

QUANTITY	EQUIPMENT	MODEL	USAGE
1	Signal Generator	Hewlett Packard 606B	Performance checks and adjustments, paragraphs 3-85, 3-100, 3-123, 3-125, 3-149
1	Electronic Counter	Systron Donner 7018	Performance checks and adjustments, paragraphs 3-90, 3-95, 3-123, 3-125, 3-127, 3-129, 3-131, 3-145
2	Calibrated Attenuators	Kay Electric 30-0	Performance checks, paragraph 3-115
1	Sweeping Signal Generator	Hewlett Packard 675a	Adjustments, paragraph 3-123, 3-125
1	Oscilloscope	Tektronix 545	Adjustments, paragraphs 3-123, 3-125, 3-143
1	Dc Power supply, 12Vdc		Adjustments, paragraphs 3-123, 3-125
1	Oscilloscope with high impedance probe (10 megohm, 5 pf)		Adjustments, paragraphs 3-131, 3-133, 3-137
1	Dc Voltmeter		Adjustments, paragraph 3-147

NOTE

Equivalent equipment may be substituted for above items.

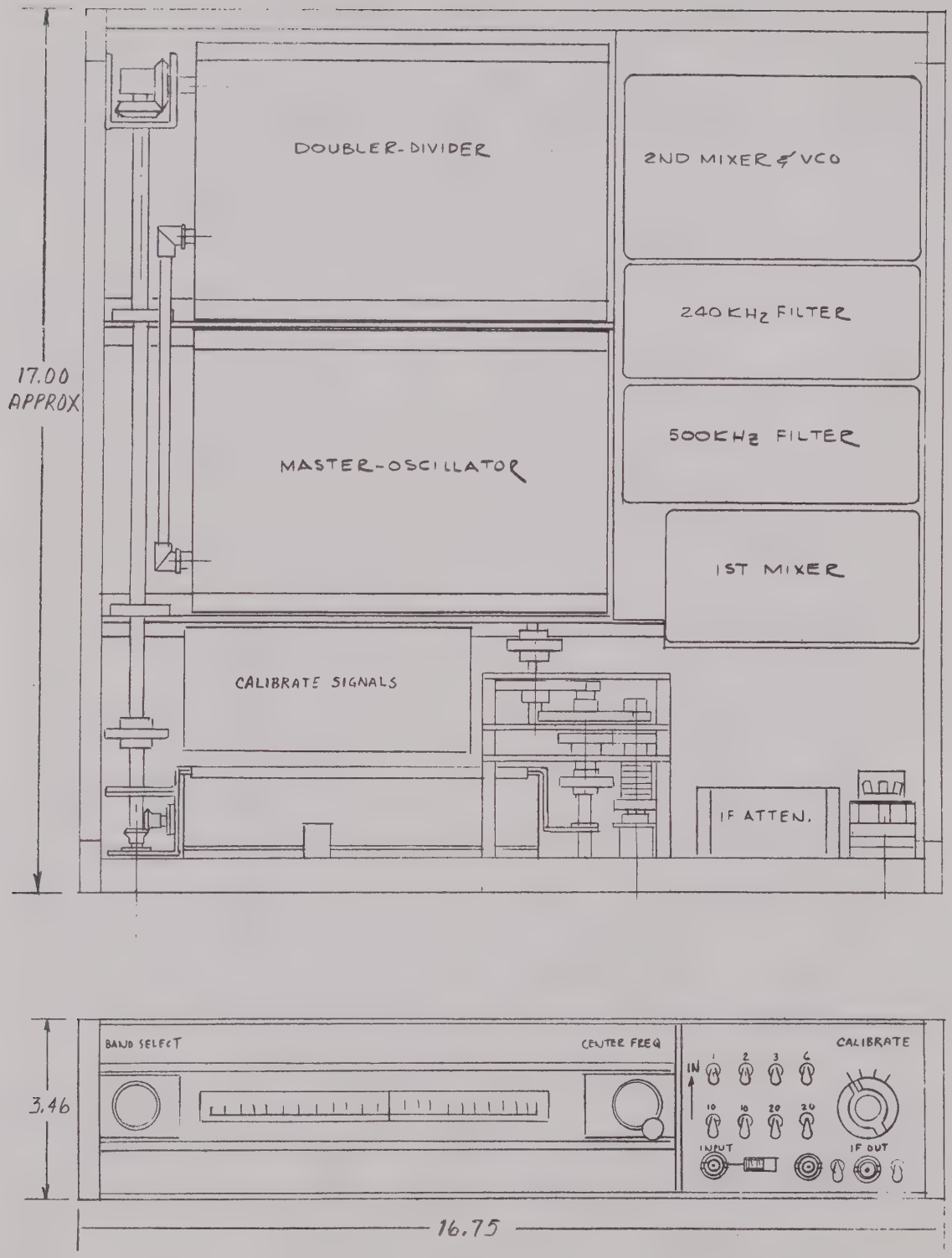


Figure 3-2. Outline and Dimensional Drawing

SECTION II
PREPARATION FOR USE

3-17. UNPACKING AND INSPECTION.

3-18. Open shipping carton, carefully remove instrument from carton, and thoroughly inspect for evidence of damage during shipment. Remove and file the warranty card.

3-19. MOUNTING.

3-20. Figure 3-2 shows the outline dimensions of the converter. The front and rear corner end trims of the Model 725 spectrum analyzer are used to attach converter to top of Model 710B/800B spectrum analyzer. To mount the converter, proceed as follows:

a. Remove screws at four corners of unit.

b. Position converter inside the frame formed by corner end trims and align screw holes.

NOTE

Converter mounts directly on top of Model 710B/800B spectrum analyzer. The complete Model 725 single sideband spectrum analyzer unit consists of Model 710B/800B spectrum analyzer with Model 806 converter next above, followed by Model 7127 two tone generator on top.

c. Install screws through corner end trims.

3-21. REAR PANEL CONNECTORS.

3-22. Functions of the two rear panel connectors are as follows:

a. POWER INPUT. Provides connection for regulated dc voltages and signal leads. A matching cable connects to rear panel of Model 710B/800B spectrum analyzer.

b. 1ST LO OUTPUT. Coaxial connector provides access to the first local oscillator. Signal of 50 mV rms, 50 ohms output impedance, has frequency 500 kHz above the frequency to which center frequency dial is tuned.

3-23. SET-UP PROCEDURE.

3-24. The Model 806 converter can be operated only in conjunction with the Model 710B/800B spectrum analyzer. To set up the instrument for operation, proceed as follows:

a. Place the POWER ON toggle switch on Model 710B display unit to off (down) position.

b. Connect display unit and converter interconnecting cable, Part No. 36000-010 between rear panels of converter and Model 710B/800B spectrum analyzer.

c. Connect coax cable, Part No. 36000-009 between OUT-IF connector on converter front panel and 240 KHZ INPUT connector on 800B front panel, placing adjacent toggle switch to 240 KHZ (left) position.

d. Converter is now ready for calibration, or to accept signals connected at INPUT connector on front panel.

SECTION III
GENERAL THEORY OF OPERATION

3-25. OVERALL FUNCTIONAL DESCRIPTION.

3-26. Figure 3-3 is a simplified block diagram of the 806 converter, showing in addition the signal flow into the 800B plug-in indicator. The converter accepts signals from 10 Hz through 64 mHz and converts them to a 240 kHz IF signal which is then fed into the 800B plug-in indicator. The conversion takes place in two steps, the first conversion occuring to a 500 kHz IF, and the second going to 240 kHz.

3-27. The input signal is applied through the signal input connector to a slide switch which selects 50 ohms or 600 ohms input impedance. The signal is then applied to a 50 ohm step attenuator. The input impedance switch matches the 600 ohm input to the 50 ohm attenuator with a resistive network which results in a 20 db loss. In the 50 ohm position the signal is applied directly to the input attenuator. The incoming signal then feeds the first double balanced mixer. The first local oscillator frequency mixes with the incoming signal to produce the IF signal. The first local oscillator, figure 3-4, is a band switched variable frequency oscillator whose output frequency goes from 500 kHz to 64.5 mHz in 7 bands. The local oscillator frequency is normally tuned so that it is 500 kHz above the incoming frequency. The output of the mixer contains, in addition to the desired 500 kHz difference signal, sum signals and additional components that are derived from multiples of the local oscillator frequency. The output of the mixer is filtered through a bandpass filter with 100 kHz bandwidth and good rejection of frequencies outside the pass band.

3-28. The signal is amplified and then applied to a second mixer. The second local oscillator is either a 740 kHz crystal oscillator or a variable frequency voltage controlled oscillator (VCO) centered at 740 kHz. The crystal oscillator is used when the frequency

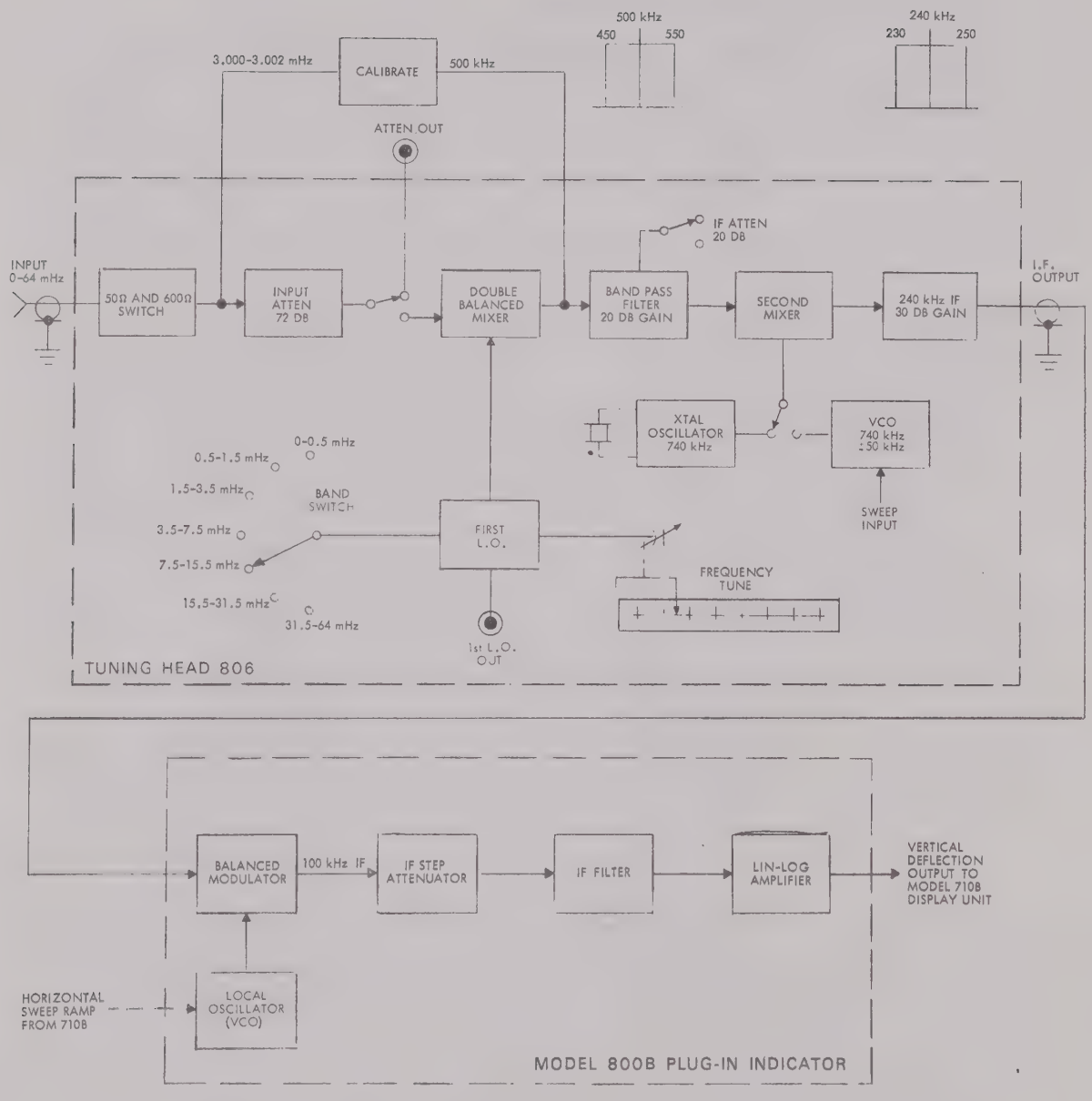


Figure 3-3. Simplified Block Diagram, Converter

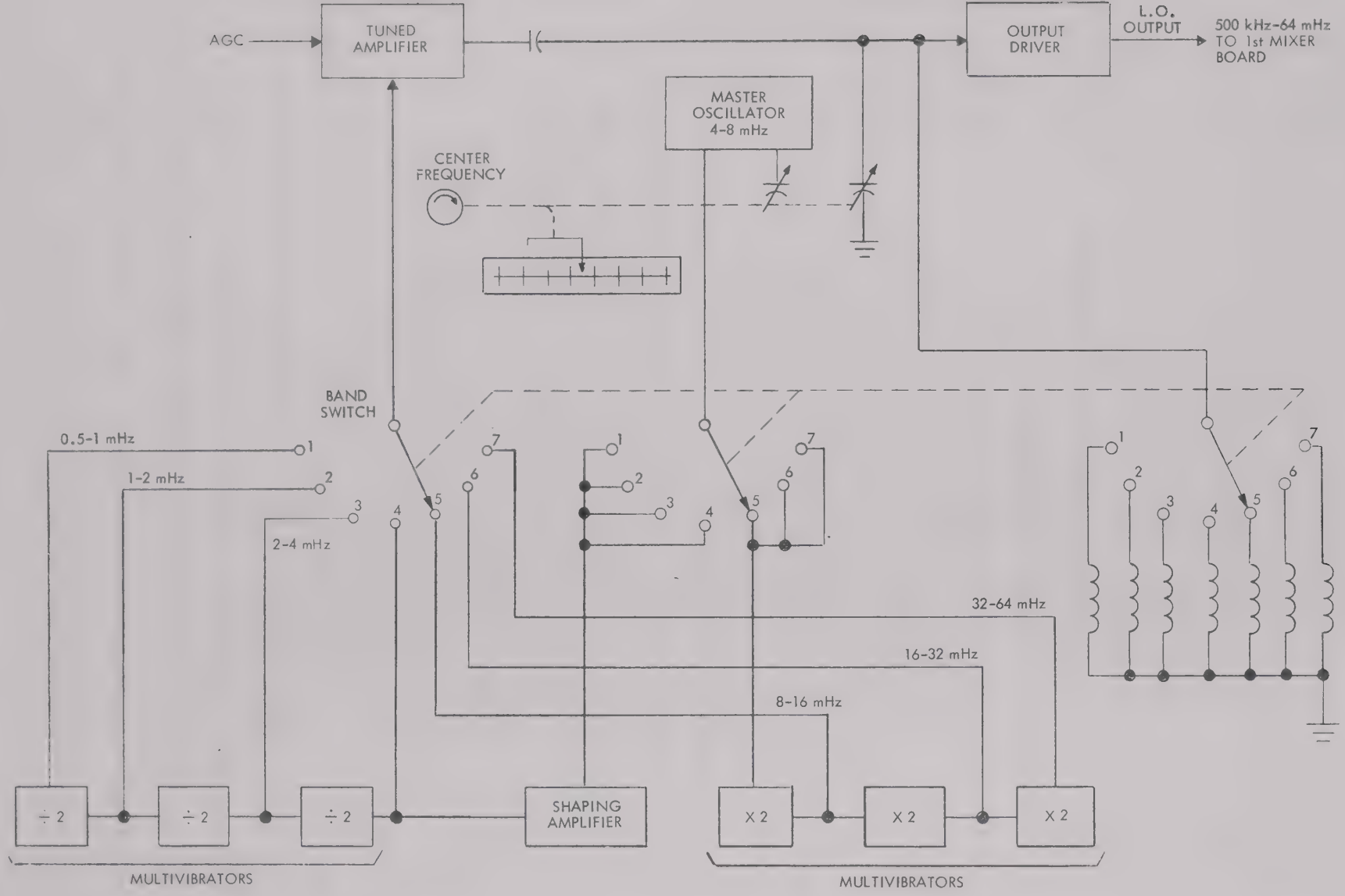


Figure 3-4. Block Diagram, First Local Oscillator Circuitry, Doubler Divider

scan of the analyzer occurs in the 3rd conversion which is located in the 800B. In the widest scan positions of 3 kHz/cm and 10 kHz/cm, the third local oscillator is kept fixed and the 740 kHz swept oscillator is used for the frequency scan. The IF frequency at the output of the mixer is 240 kHz, the difference frequency of the 740 kHz local oscillator and the incoming 500 kHz signal. A 240 kHz IF filter rejects all other mixer products. After some more amplification, the output is fed into the 800B.

3-29. The 240 kHz signal input to the 800B is fed directly into the mixer which transforms the signal into a 100 kHz IF. The local oscillator of the 800B is set at 140 kHz and swept about this frequency in all but the two highest scan positions. The output of this mixer feeds the IF filter which determines the bandwidth of the analyzer. The LIN-LOG amplifier which follows provides additional gain and logarithmic shaping when desired. The final signal is detected and fed into the vertical deflection circuits of the 710S display unit cathode ray tube.

3-30. The 500 kHz calibrate signal is fed directly into the 500 kHz filter at the output of the first mixer. The 3.000/3.002 mHz two tone signal goes directly to the input attenuator.

3-31. DETAILED CIRCUIT DESCRIPTION.

3-32. Refer to schematic diagram of 806 converter, figure (3-16)for a breakdown of the modules and the interconnecting wiring.

3-33. INPUT CIRCUITS. The input impedance selector switch, S301, feeds the input signal from J301 directly into the input attenuator when in the 50 ohm position. When the input impedance selector switch is in the 600 ohm position, a matching pad consisting of R302 and R301 sets the input impedance at 600 ohms, with a corresponding loss of 20 db. The input attenuator AT301, has 50 ohm input and 50 ohm output and consists of toggle switched pads which are selectively thrown in and out for the required attenuation. See Figure 3-17 for schematic.

3-34. FIRST MIXER-AGC CIRCUITS. Refer to figure 3-18 for schematic of the 1st mixer and the AGC circuitry. The double balanced mixer is mounted on PCB307 with the rest of the circuits. The signal from the local oscillator generator (Doubler Divider Assy A302) feeds into the PCB 307 at point 2, where it is subsequently amplified by a factor of 50 in an integrated circuit, AR1. The signal is amplified further through emitter follower Q3 and amplifier which is coupled through transformer T1 to the doubled balanced mixer assembly AR2. The signal from the input attenuator comes in at point 7 to the balanced modulator, and the IF output, point 6, feeds the 500 kHz filter board. The local oscillator drive level is average detected with CR2, R7 and C7. This dc level is compared to a reference AGC level in difference amplifier AR3 with the output error signal used to vary the gain in the local oscillator generator so as to maintain the local oscillator drive level constant at the mixer.

3-35. MASTER OSCILLATOR. The master oscillator, A301, from which the local oscillator signal is derived, is a highly stable variable frequency oscillator which tunes over an octave. Figure 3-19 shows the schematic of the oscillator. Q1 is the FET amplifier in a Clapp oscillator whose frequency is made to vary from 4 MHz to 8 MHz by means of a variable capacitor, C1. Q2 serves as a buffer amplifier to drive the doubler divider assembly. The master oscillator is completely self-contained in a rigid box for utmost stability. The variable capacitor C1 is coupled through a gear mechanism directly to the front panel center frequency dial.

3-36. DOUBLER DIVIDER. The doubler divider receives the signal of 4 to 8 MHz from the master oscillator and either multiplies it or divides it in steps of 2 to derive the local oscillator signal in 7 switched octave bands from 500 kHz to 64.5 MHz.

3-37. Block Diagram Description. Refer to figure 3-4 for the block diagram of the doubler divider. The master oscillator feeds into the input wafer of the band switch which selects either the divide mode for the first 4 bands, or the multiply mode in the last 3 bands. In the divide mode, the signal is first shaped and then used to drive a bistable multivibrator which results in a division of the frequency by two. The signal is again divided to produce a 1-2 MHz band and the 0.5-1 MHz band.

3-38. In the multiply mode, the input frequency is fed into doublers which successively multiply the signal up to the last octave band of 32-74 MHz.

3-39. The output wafer of the band switch selects the proper frequency range and feeds it into a tune amplifier which has a tank circuit to eliminate unwanted frequencies. An AGC voltage fed back from the 1st mixer board adjusts the gain of the tuned amplifier so that the local oscillator drive remains constant. An output driver following the tuned circuit feeds the 1st mixer board,

3-40. Detailed Circuit Description. Refer to figure 3-19 which gives the schematic of the doubler divider assembly. For bands 1 through 4, covering 0.5 MHz to 8 MHz, the incoming reference signal is fed through J2 and S1-1 to Z1, an integrated circuit which clips the sine wave and shapes the leading edge of the pulses so that they can trigger the divider multivibrators. Integrated circ uit Z2 contains two multivibrators which are wired in series to provide division by 2 at point 10 and by 4 at point 11. The last division is accomplished in Z3 which provides 0.5 MHz to 1 MHz at point 13. The outputs are connected to band switch S1-4.

3-41. In the multiply mode the reference signal is fed into Q4, an amplifier with a doubler circuit T1, CR1, CR2 in the collector. The doubler is basically a full wave rectifier configuration. Further multiplication by 2 is accomplished in stages Q5 and Q6.

3-42. The outputs of each doubler are connected to the band switch S1-4. The selected output from the band switch is amplified in Q7 which has a tank circuit in the collector. The inductors for each band are switched by S1-5 and S1-6, while the tuning to the fundamental frequency is accomplished by C38. This tuning capacitor is ganged mechanically to the master oscillator tuning capacitor.

3-43. The output of the tank circuit is coupled through C39 into a double emitter follower Qi, Q9, whose output at J3 is used to feed the first mixer assembly. The AGC voltage fed back from the first mixer assembly is used to vary the supply voltage to Q5 and Q7. As this dc voltage goes more positive the gain of the amplifiers increases, providing a stronger signal at the output.

3-44. 500 kHz FILTER. Refer to figure 3-20 for the schematic of the 500 kHz filter board. The signal from the first mixer is applied directly to the input pin 1 of the 500 kHz filter. L1 to L5 and C1 to C5 comprise a bandpass filter whose center frequency is 500 kHz with a bandwidth of 120 kHz. The output of the filter is fed into transformer T1 which steps up the impedance level from 50 ohms to 5 kHz. Q1 is a MOS FET which provides additional gain with low intermodulation distortion. Q2 is an emitter follower with two outputs, pin 4 and pin 5. The IF attenuator switch on the front panel selects either the direct output (pin 4) or an output attenuated by 20 db (pin 5).

3-45. SECOND MIXER. Refer to figure 3-21 for the schematic of the second mixer assembly. The double balanced mixer assembly is composed of diodes CR5, CR6 or CR7, CR8 ;and balanced transformer T1 and T2. The input to the mixer comes in at pin 5 at a nominal input frequency of 500 kHz where it is further filtered in a low pass filter, L2, L3, L21 through L25. The local oscillator signal at a center frequency of 740 kHz is fed into T1 from an amplifier stage, Q4. The drive signal

to the amplifier is selected as a fixed frequency, 740 kHz, coming through R25, or a swept frequency input applied through R30.

3-46. The Crystal oscillator uses Z2 as the amplifier with the X1 crystal acting in the series resonance mode to provide the feedback to the input of the amplifier.

3-47. The swept 740 kHz oscillator is made up of Q1 and Q2 which are connected in an astable multivibrator configuration. The frequency of oscillation is determining by the voltage at the junction of R11 and R14. An operational amplifier Z1 is connected in the inverting fashion to provide the proper dc and swept signal level at the drive to the multivibrators. The center frequency of the oscillator is set by R2 which is basically a dc level shift for the operational amplifier output. The sweep voltage input at pin 2 comes in from the 800B and is inverted in Z1. The scan width of the oscillator is adjusted by R3 which adjusts the amplitude of the sweep voltage. When the scan width of the analyzer is set at 30 kHz, 50 kHz, and 100 kHz, the +12 Vdc supply at pin 1 is activated ao that the VCO signal feeds into Q4, while the crystal oscillator 12 V supply at pin 3 is turned off. In narrower scan widths the reverse is true. The converted 240 kHz output signal appears at pin 6 and feeds the 240 kHz filter board.

3-48. 240 kHz FILTER. Refer to figure 3-22 for the schematic of the 240 kHz filter board. The signal from the second mixer is fed into point 1 directly to a bandpass filter centered at 240 kHz with a bandwidth of 20 kHz. L1 through L6 and C1 through C6 are the elemenents of the filter. The 50 ohm output impedance is transformed up to 5 kHz through step up transformer T1. FET Q1 provides a low distortion gain of the signal. Emitter follower Q2 provides a low impedance output of the final 240 kHz IF signal. This output goes directly into the 800B input for further processing.

3-49. SELF-TEST BOARD. Refer to figure 3-23 for the schematic of the self-test board. A 3.000 MHz oscillator is comprised of amplifier AR1 and 3.000 MHz crystal X1, operating in the series mode. A similar circuit using AR2 and X2 generates the 3.002 kHz test signal. Emitter followers Q5 and Q6 isolate the oscillators from the output to reduce intermodulation distortion. The signals from the emitter followers are added together via resistors R5 and R26. Potentiometers R8 and R10 adjust the amplitude of the signals independently. Two equal amplitude signals for two tone testing of the analyzer system go out through pin 1 and feed into the input attenuator through an isolating resistor. The two tone test signal is switched on by meand of the 12 Vdc supply coming rhough pins 2 and 6.

3-50. The 500 kHz oscillator is comprised of amplifier AR 3 and crystal X3. This circuit is similar to the 3 MHz oscillators. An astable multivibrator operating at 5 kHz frequency is composed of Q2 and Q3 and associated resistors and capacitors. The frequency of the multivibrator is locked onto a submultiple of the 500 kHz crystal oscillator via C26.

3-51. The amplitude modulation is accomplished in Q1. The 5 kHz modulation signal injected into the base of Q1 alternately connects the collector of Q1 to open and ground. The signal appearing at the output pin 4 is a square wave modulated 500 kHz signal. When the 12 Vdc supply to the 5 kHz multivibrator is removed from the pin 5, the modulation transistor Q1 remains off so that the output signal is straight CW.

SECTION IV
OPERATING INSTRUCTIONS

3-52. SCOPE.

3-53. This section contains descriptions of front panel controls and indicators, a self-test calibration procedure, and procedures for operation of the converter in conjunction with the 710B/800B spectrum analyzer.

3-54. FRONT PANEL CONTROLS AND INDICATORS.

3-55. The front panel controls and indicators are illustrated in figure 3-5, and are listed and described in table 3-3.

3-56. SELF-TEST CALIBRATION PROCEDURE.

3-57. After reviewing the functions of the controls and indicators described in table 3-3, perform the following procedure to self calibrate the equipment to make it ready for use.

NOTE

Operation of 806 converter is performed in conjunction with Model 710B/800B spectrum analyzer. Refer to Chapter 2, Section IV, figure 2-7 for identification of controls and connections mentioned in this procedure.

a. Throw the INPUT mode toggle (22) on the 800B to the 240 KHZ position.

b. Connect a cable between the OUT-IF bnc (8) on the converter 806S and the 240 KHZ INPUT (28) on the 800B.

c. Set the OUT mode toggle (7) on the 806 to the right, OUT-IF position.

d. Set the IF-ATTEN (9) to 20 db in position.

e. Set the 710B SWEEP TIME (7) and 800B IF BANDWIDTH (13) to AUTO position. The 800B SCAN WIDTH (18) should be set in the 1.0 KHZ/cm position and the IF RESPONSE (16) in the LOG mode.

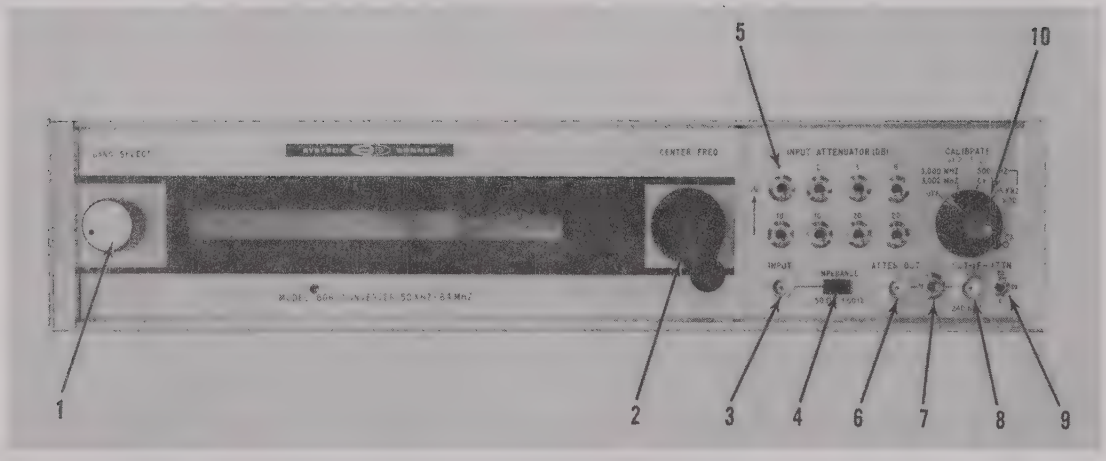


Figure 3-5. Front Panel Controls and Indicators

Table 3-3. Front Panel Controls and Connectors

1.	BAND SELECT switch	Selects any of 7 bands.
	Band 1. 0 to 500 KHz	
	2. 500 KHz to 1.5 MHz	
	3. 1.5 MHz to 3.5 MHz	
	4. 3.5 MHz to 7.5 MHz	
	5. 7.5 to 15.5 MHz	
	6. 15.5 MHz to 31.5 MHz	
	7. 31.5 MHz to 64 MHz	
2.	CENTER FREQ	Sets the frequency to which the instrument is tuned. Has a built in fine tune adjustment.
3.	INPUT - bnc connector	Accepts signal from 10 Hz to 64 mHz.
4.	IMPEDANCE slide switch	Selects input impedance of either 50 ohms or 600 ohms. The latter results in approximately a 20 db loss in signal strength.
5.	INPUT ATTENUATOR (DB)	Adjusts the input signal level so as not to overload the first mixer. (In one db steps up to 72 db.) Maximum input level, 20 dbm. Accuracy, 0.05 db/db.
6.	ATTEN OUT-bnc connector	Provides access to output of the input attenuator when the toggle adjoining (7) is switched to the left. When the ATTEN OUT is connected to the 10 Hz-50 kHz input of the 800B plug-in indicator, an attenuator with 1 db steps is obtained for the 50 ohm or 600 ohm position of IMPEDANCE switch.
7.	ATTEN OUT or OUT-IF Mode Selector toggle switch	Connects the output of the input attenuator to the ATTEN OUT bnc, or to the first mixer. This switch is normally set to the right, selecting the OUT-IF bnc when the converter is active.

Table 3-3. Front Panel Controls and Connectors (Cont)

8.	OUT-IF bnc	The output of the converter which contains the 240 kHz IF frequency. This is connected to the 240 kHz input of the 800B plug-in indicator when toggle switch (7) on the left of this connector is thrown to the right.
9.	IF-ATTEN	A toggle switch which throws in 20 db of attenuation in the first IF. This is normally set with 20 db in to remove noise from the baseline. For maximum sensitivity the switch should be set for 0 db.
10.	CALIBRATE switch	Provides built in calibration for the center frequency, scan width, and two tone intermodulation distortion. When the switch is in the 500 KHZ CF position, a 500 kHz single frequency is injected directly into the first IF. The AMPLITUDE is adjustable by means of the concentric potentiometer of the switch. The signal is centered on screen of the 710B display unit by means of the frequency tune dial of the 800B plug-in indicator. This calibrates the system so that the first local oscillator output is exactly 500 kHz higher than the incoming signal centered on screen. When the switch is in the 500 KHZ +5 KHZ MOD mode, the 500 kHz signal is amplitude modulated with 5 kHz so that markers appear every 5 kHz on screen display for at least 200 kHz scan width. When the CALIBRATE switch is in the 3.000 MHZ/3.002 MHZ position, two frequencies of 3 mHz spaced 2 kHz apart are injected directly to the input. The level of the signals can be adjusted by the input attenuator toggles. The CENTER FREQ dial on the 806 is used to tune the signals on screen at 3.0 mHz.

Table 3-3. Front Panel Controls and Connectors (Cont)

10.	CALIBRATE switch (cont)	The amplitude is set for full scale and the odd order intermodulation products should be at least 70 db down.

f. Set the 806 CALIBRATE switch (10) to the 500 KHZ CF position.

NOTE

DIAL MULT switch (19) on 800B is not connected for the 240 KHZ IF mode. In addition, center frequency of 806 should be set about 2500 Hz for a centered signal. The CENTER FREQ dial (2) is calibrated to read in Hz going from 000 to 5000 Hz so that accurate calibrated fine tuning adjustments can be made.

g. A signal should appear on screen. Vary the CENTER FREQUENCY control (21) on the 800B so that the signal is centered at mid screen. Vary the AMPLITUDE adjust potentiometer which is concentric with the CALIBRATE switch (10) and note that the amplitude of the signal varies at least 40 db. If any extraneous signals other than the main 500 kHz test tone are present, tune the CENTER FREQ dial (2) of the 806 converter and they should disappear. These extraneous signals, which are down from the main response by about 50 db, are harmonics of the 500 kHz test mixing with first local oscillator and its harmonics.

h. Set the 806 CALIBRATE switch (10) to the 500 KHZ + 5 KHZ position. Set the 800B SCAN WIDTH (18) to 5 KHZ/cm. position. The center frequency signal should appear as before, but with reduced amplitude and with markers spaced one centimeter (5 kHz) apart. See figure 3-6.

i. Throw in 20 db in the INPUT ATTENUATOR (5) on the 806. Set the CALIBRATE switch (10) to the 3.000/3.002 MHZ position.

j. Tune the CENTER FREQ dial (2) on the 806 to 3.00 mHz and position the signal that appears at mid screen.

k. Set the 800B SCAN WIDTH (28) to 1.0 KHZ/cm. Two signals of equal amplitude should appear, spaced 2 kHz apart (2.0 cm). Adjust the amplitude of the signals using the 806 INPUT ATTENUATOR (5) so that the signals are full screen with the 800B IF RESPONSE (16) set in LOG mode. Any other signals, odd order intermodulation products, should be down at least 70 db and barely visible. See figure 3-7.

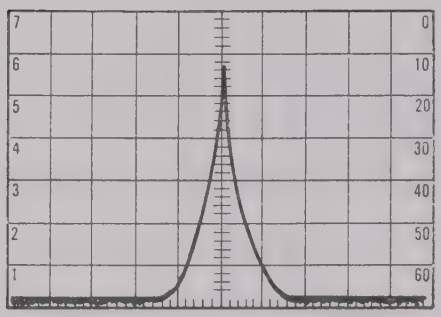
3-58. SIGNAL ANALYSIS PROCEDURE.

3-59. To become familiar with the capabilities of the Model 806 converter, provide an external signal source and proceed as directed below.

CAUTION

Avoid application of excessive power from external signal source, with consequent damage to equipment. Observe the following limitations: input attenuator maximum power - 250 milliwatts. First mixer maximum power (after input attenuation) - 50 milliwatts.

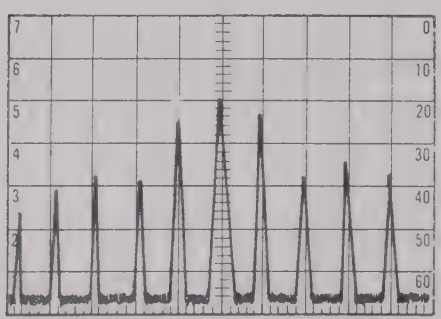
A



500 KHZ CALIBRATION CHECK

Figure 3-6. Calibrated Center Frequency Display

B



500 KHZ AND 5 KHZ CALIBRATION CHECK

SCALE ILLUMINATION 6V
F STOP 8
SHUTTER 5 SEC

Figure 3-7. Intermodulation Check Display

3-60. Connect an external test signal to the INPUT bnc (3) on the 806. Set BAND SELECT switch (1) to the band of interest and adjust CENTER FREQ control (2) until signal appears on screen. When tuning to the signal, set the 800B SCAN WIDTH (18) to 10 kHzOcm so that the maximum window is used.

3-61. Set the INPUT ATTENUATOR (5) so that signal does not go off screen in the LOG display mode. With no input attenuation, the signal is applied directly to the first mixer. Observe precautions against overloading.

3-62. The frequency dial is calibrated so that the local oscillator (LO) frequency is 500 kHz above the incoming signal. A counter monitoring the LO output bnc located on the rear panel of the 806 will allow very accurate measurement of the frequency which the analyzer is displaying. Because there is no preselection, an image frequency will appear at exactly 1 MHz away on the dial from the proper frequency. This will be lower in frequency but the amplitude will be the same as the desired signal. To identify images, note that as the CENTER FREQ dial (2) is turned in the clockwise direction (increasing frequency) the proper signals will move toward the left on the screen. The lower frequencies appear at the left of the presentation. The image frequencies can be identified by noting that they move to the right as the dial is cranked clockwise.

SECTION V
MAINTENANCE

3-63. GENERAL.

3-64. Careful and regular performance of periodic preventive maintenance will reduce the probability of failure and necessity for corrective maintenance. Should malfunction or failure occur, proceed as directed under Troubleshooting, paragraph 3-73, and Repair and Replacement, paragraph 3-80.

3-65. TEST EQUIPMENT.

3-66. The test equipment required for calibration, performance testing, and troubleshooting the model 806 Converter is listed in table 3-2.

3-67. PREVENTIVE MAINTENANCE.

3-68. INSPECTIONS. Perform periodic inspections as follows:

Period	Area of Inspection	Items to be Checked
Weekly	Exterior of unit, particularly front and rear	Controls, indicators, connectors, wiring, and hardware for dust and dirt, security of mounting or connection, signs of damage.
Monthly	Interior of unit, including individual assemblies	Electrical parts and wiring (including printed circuit wiring) for dust, dirt, corrosion, evidence of overheating or other damage. Mechanical parts (including bearings) for loose or binding operation, other signs of damage.

3-69. CLEANING. Remove dust, dirt, and other foreign material using a small soft bristle brush and vacuum cleaner. Use filtered, moisture-free compressed air at maximum pressure of 5 psig if vacuum cleaner is not available. When using air, be sure to aim the stream to blow foreign material away and out of the unit being cleaned, rather

than into recesses, slots, etc. Use a clean cloth and a no-residue solvent, such as methyl-ethyl keytone to remove material not removable by above means.

CAUTION

Avoid scratching printed circuit wiring if brushing or rubbing is necessary to remove foreign material. If solvent is used, allow moistened areas to airdry completely before placing in service.

3-70. LUBRICATION. No lubrication is required.

3-71. PERFORMANCE TESTS. Conduct performance checks as directed in paragraph 3-82 at monthly intervals.

3-72. CALIBRATION. Perform calibration procedures at 6-month intervals, in conjunction with performance checks, and at other times as necessary to verify measurements obtained.

3-73. TROUBLESHOOTING.

3-74. In general, faults in the converter can be divided into two categories. The first category - degradation faults - are indicated by gradual deterioration in equipment performance. This type of fault is detectable by making the performance checks periodically, and noting changes in the recorded readings. Often this type of fault can be corrected by recalibration, but unusually frequent recalibration or inability to achieve calibration is an indication of a marginal or defective component that should be isolated and replaced. The second category of fault - component failure - produces an obvious failure of the converter as reflected in performance of the spectrum analyzer, such as a loss of display, loss of frequency scan, or loss of signal between the input and the display.

3-75. For degradation faults, an analysis of the specific performance test or calibration procedure that is abnormal will usually permit localization of the trouble. For component

failures, it is usually necessary to first isolate the trouble to a particular module or circuit board of the converter. Then, further trouble isolation is accomplished by signal checks in the defective unit.

3-76. PRELIMINARY TROUBLESHOOTING CHECKS. Before performing a logical analysis of the trouble, it is recommended that certain preliminary checks be performed. Frequently, these preliminary checks will permit isolation of the fault without the necessity of a lengthy, step-by-step analysis. The following preliminary checks are recommended:

a. Check all operating controls to assure that the trouble is not being caused by an incorrect control setting.

b. Check all external connections to the unit to verify that the trouble is not being caused by a loose or defective connection.

c. Assure that the Model 800B Plug-In Indicator is securely in place, and that the connections between the Model 800B and the Model 710B Display Unit are mechanically tight.

d. Open the covers of the modules and circuit boards of the 806 converter and visually inspect the units for broken or improper connections, broken wires, burnt insulation, and evidence of overheating.

3-77. ISOLATING THE FAULT TO THE UNIT LEVEL. To determine whether the fault is in the Model 710B/800B Spectrum Analyzer or in the Model 806 Converter, proceed as follows:

3-78. Check the 710B/800B independently in the audio mode.

a. Refer to Chapter 2, figure 2-7, Front Panel Controls and Indicators, and set IF RESPONSE (16) to LOG, SCAN WIDTH (18) to 1.0 kHz/cm, and INPUT selector toggle (22) to 240 KHZ.

b. Using an external signal source, feed in a 240 kHz signal at a level of 70 to 80 mV rms to the 240 KHZ INPUT connector (28).

c. The signal should appear centered on the screen at full screen (7 cm) amplitude, ±3 db.

d. If the 710B/800B spectrum analyzer checks out properly, proceed with troubleshooting of the 806 converter.

3-79. DETAILED TROUBLESHOOTING. Once the trouble has been isolated to 806 converter, make voltage and waveform checks to isolate the trouble. The schematic diagrams at the end of this section include voltages and waveforms at critical circuit points. The notes on the schematic diagrams define the input signal conditions and control settings under which the voltages and waveforms should be measured. Remember that these waveforms and voltages are nominal, and that some variations can be expected from unit to unit.

3-80. REPAIR AND REPLACEMENT.

3-81. The locations of the major assemblies, subassemblies, and adjustments in the Model 806 Converter are provided in figure 3-8. The diagrams at the end of this section include parts location information for each printed circuit board assembly. Complete replacement parts data is provided in Section VI.

3-82. PERFORMANCE CHECKS.

3-83. This heading contains the following performance check procedures:

a. Response Flatness and Frequency Range

b. Tuning Head Frequency Accuracy

c. Tuning Head Stability

d. Image Rejection

e. Sensitivity

f. Dynamic Range (Intermodulation Distortion)

g. Input Attenuator Accuracy

3-84. These performance checks permit verification that the converter meets the applicable performance specifications in table 3-1. Associated with the performance checks, a performance check record form (table 3-4) is provided at the end of this heading. The table contains blanks for entering the actual measurements made during the performance checks. This table should be duplicated so that a new record can be made each time the performance checks are performed. A comparison of these records will reveal any significant changes in readings, which would indicate incipient malfunctions, and/or the impending need to recalibrate the instrument. Failure to meet performance specification limits, as given in table 3-4, indicates either an equipment malfunction or the need to recalibrate the instrument.

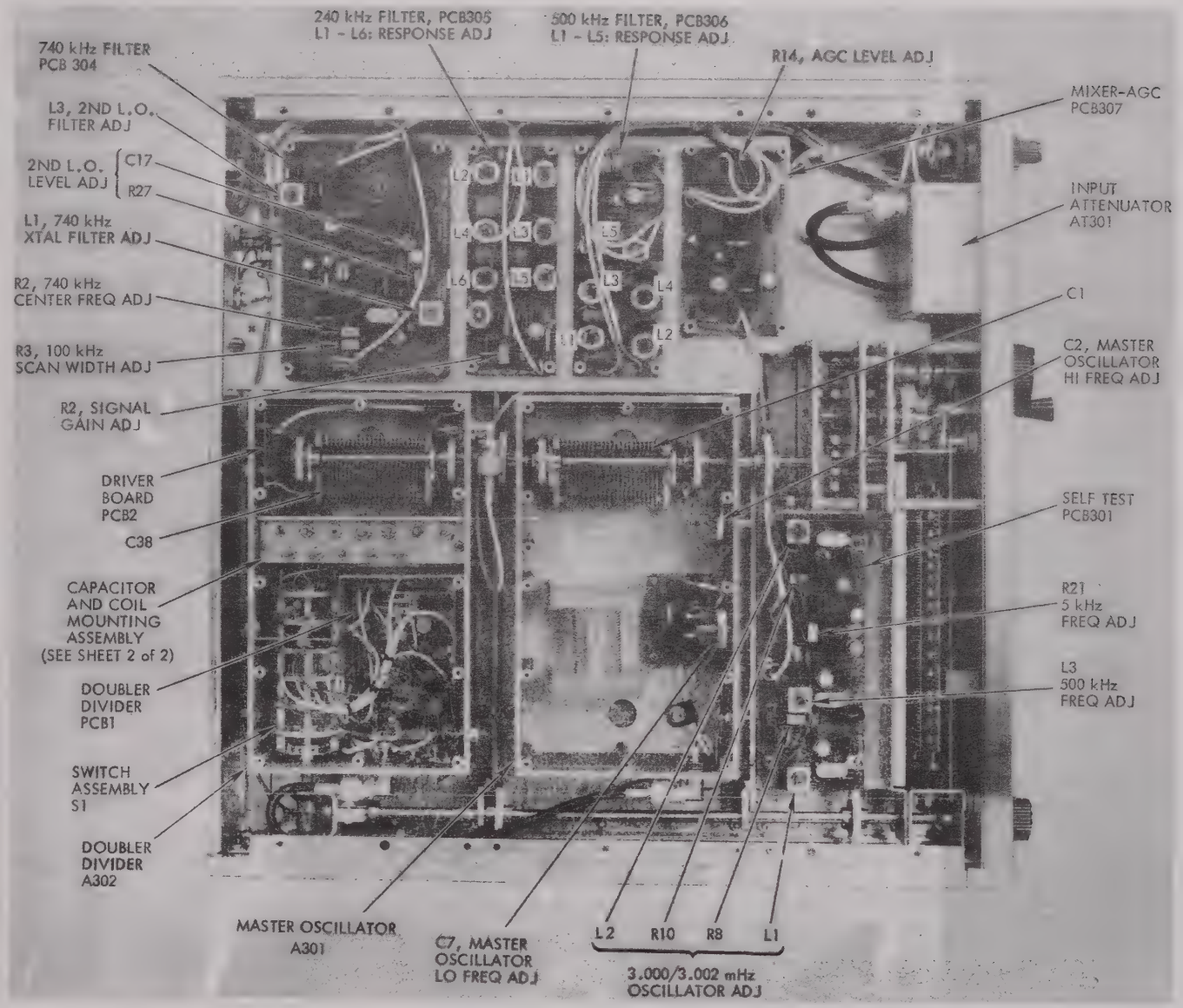

740 kHz FILTER PCB 304
240 kHz FILTER, PCB305 L1 - L6: RESPONSE ADJ
500 kHz FILTER, PCB306 L1 - L5: RESPONSE ADJ
R14, AGC LEVEL ADJ
MIXER-AGC PCB307
L3, 2ND L.O. FILTER ADJ
2ND L.O. LEVEL ADJ C17 R27
INPUT ATTENUATOR AT301
L1, 740 kHz XTAL FILTER ADJ
R2, 740 kHz CENTER FREQ ADJ
C1
R3, 100 kHz SCAN WIDTH ADJ
C2, MASTER OSCILLATOR HI FREQ ADJ
R2, SIGNAL GAIN ADJ
DRIVER BOARD PCB2
C38
SELF TEST PCB301
CAPACITOR AND COIL MOUNTING ASSEMBLY (SEE SHEET 2 of 2)
R21 5 kHz FREQ ADJ
DOUBLER DIVIDER PCB1
L3 500 kHz FREQ ADJ
SWITCH ASSEMBLY S1
DOUBLER DIVIDER A302
MASTER OSCILLATOR A301
C7, MASTER OSCILLATOR LO FREQ ADJ
L2 R10 R8 L1
3.000/3.002 mHz OSCILLATOR ADJ

Figure 3-8. Model 806 Converter, Components and Adjustments (Sheet 1 of 2)

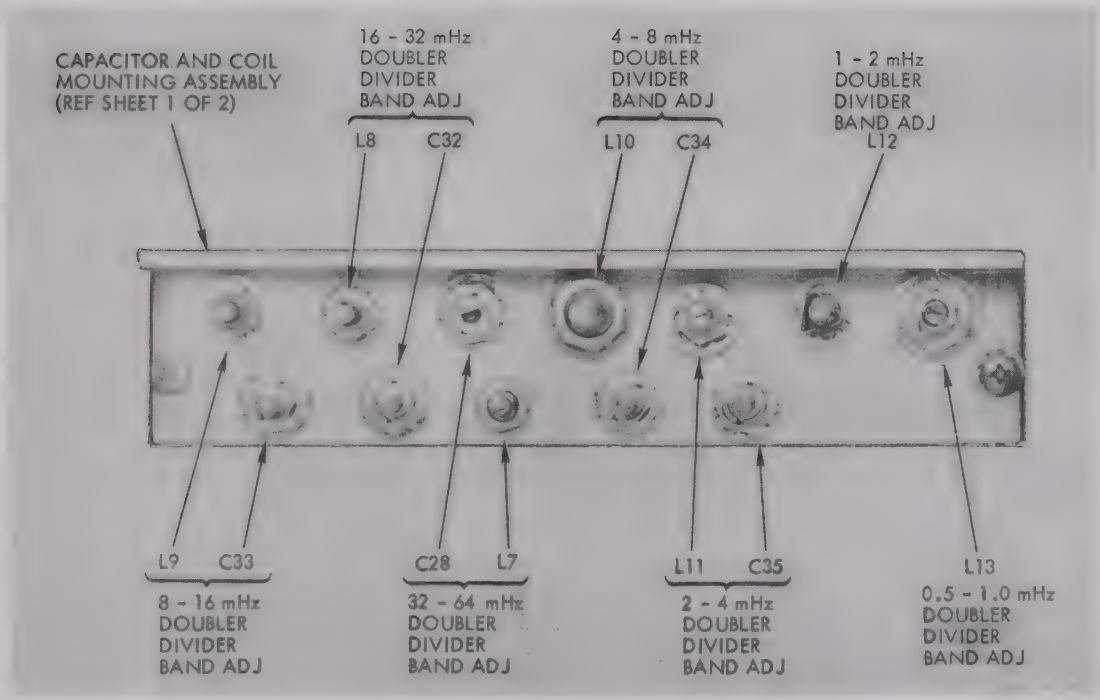

CAPACITOR AND COIL MOUNTING ASSEMBLY (REF SHEET 1 OF 2)
16 - 32 mHz DOUBLER DIVIDER BAND ADJ
L8 C32
4 - 8 mHz DOUBLER DIVIDER BAND ADJ
L10 C34
1 - 2 mHz DOUBLER DIVIDER BAND ADJ
L12
L9 C33
8 - 16 mHz DOUBLER DIVIDER BAND ADJ
C28 L7
32 - 64 mHz DOUBLER DIVIDER BAND ADJ
L11 C35
2 - 4 mHz DOUBLER DIVIDER BAND ADJ
L13
0.5 - 1.0 mHz DOUBLER DIVIDER BAND ADJ

Figure 3-8. Model 806 Converter, Components and Adjustments (Sheet 2 of 2)

3-85. RESPONSE FLATNESS AND FREQUENCY RANGE. Specification requirements:

a. Response Flatness - Table 3-1, item 8.

b. Frequency Range - Table 3-1, item 2.

3-86. Description. A high frequency, leveled, signal generator is connected to the 806 tuning head, and the display is observed in the linear mode for frequency response across the band.

3-87. Control Settings:

Control	Setting
(710B)	
SWEEP TIME	AUTO
SYNC	INT
(800B)	
IF BANDWIDTH	200 Hz
GAIN ADJUST	CAL
IF ATTENUATOR	All out
VID FLTR	OFF
IF RESPONSE	LIN
SCAN WIDTH	300 HZ/cm
CENTER FREQUENCY	2500 HZ
DIAL MULT	Any position
INPUT SENSITIVITY	Any position
INPUT IMPEDANCE	Any position
INPUT selector toggle	240 KHZ

Control	Setting
(806 Converter)	
CENTER FREQ	As required
BAND SELECT	0-500 kHz
INPUT ATTENUATOR	Out
IMPEDANCE selector	50 ohms
CALIBRATE switch	OFF
OUTPUT selector toggle	OUT-IF
IF ATTN	20 db

3-88. Equipment Required. Signal generator, calibrated and leveled to ±1/4 db. Hewlett Packard Model 606B, or equivalent. See figure 3-9 for setup.

3-89. Procedure:

a. Calibrate analyzer by tuning on the 500 kHz self-test signal. Center display by means of CENTER FREQUENCY tune knob on 800B.

b. Connect signal generator directly to 806 converter input. Set frequency at 50 kHz and amplitude to give a 6 cm deflection. This is the reference setting - maintain this level throughout the test.

c. Move signal generator signal to the next higher frequency indicated on test chart, and adjust 806 converter center frequency to locate the signal in the center. Record the cm deflection. Continue up to 40 MHz, at each frequency indicated on the chart. Signal amplitude shall be within limits specified on performance check record form (test chart).

d. Set signal generator to 200 kHz. Tune the converter so that signal is exactly on center of screen.

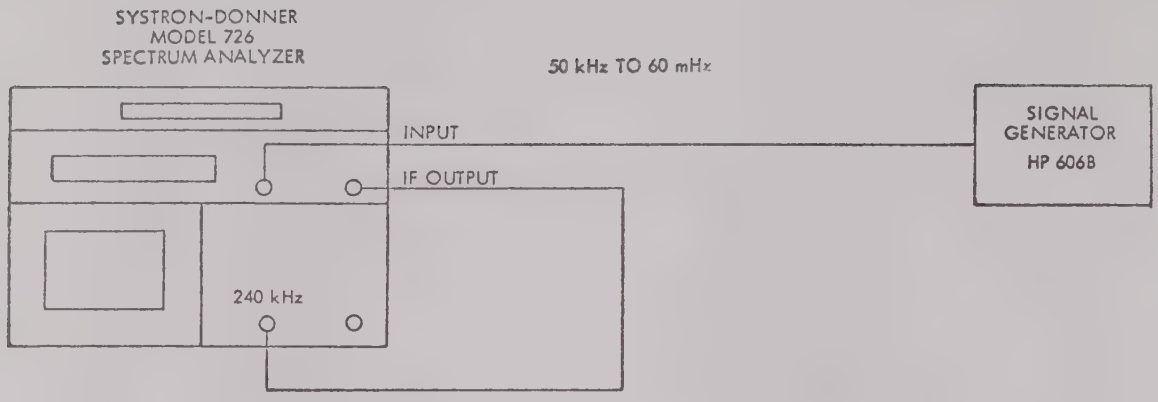


Figure 3-9. Response Flatness and Frequency Range Test Setup

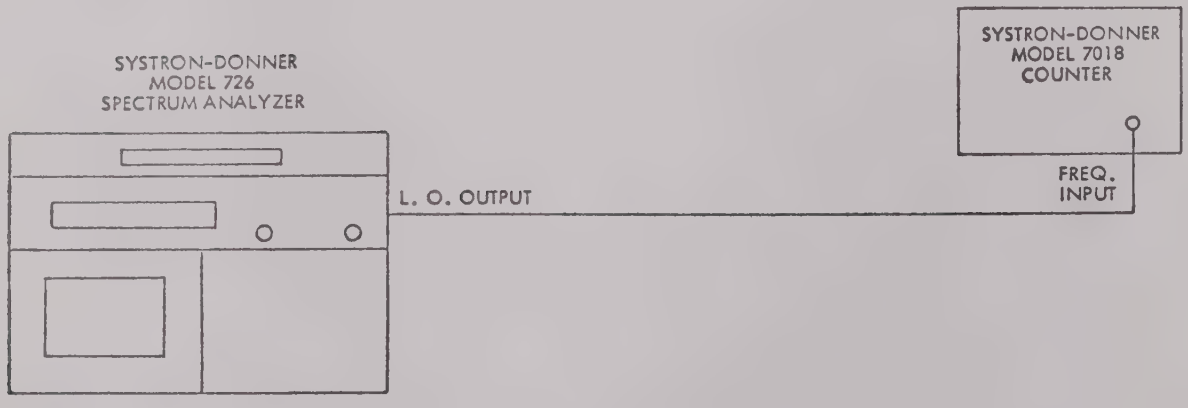


Figure 3-10. Tuning Head Frequency Accuracy and Stability Test Setup

e. Set SCAN WIDTH to 1.0 KHZ/cm position.

f. Set IF BANDWIDTH to AUTO position.

g. Set SWEEP TIME to .3 sec/cm. Adjust signal generator output so that the deflection is exactly 6 cm.

h. Vary the frequency of signal generator from one end of the screen to the other and record the maximum and minimum excursions over the band in cm. In-band flatness shall be within limits specified on test chart.

i. Set SCAN WIDTH to 10 KHZ/cm.

j. Add 20 db in the 800S IF ATTENUATOR.

k. Set IF BANDWIDTH to 3 KHZ position.

l. Adjust signal generator output for 6 cm on screen.

m. Vary the signal generator frequency from one end of the screen to the other, recording the maximum and minimum deviations in cm. In-band flatness shall be within limits specified in test chart.

3-90. TUNING HEAD FREQUENCY ACCURACY. Specification requirements: Table 3-1, item 3C.

3-91. Description. The tuning head frequency accuracy need be checked only in the fundamental band (No. 4: 3.5 mHz to 7.5 mHz) since all other bands are derived by exact multipliers or dividers. An electronic counter connected to the L.O. frequency is used to obtain a reading to compare with the dial reading of the 806 converter.

3-92. Preliminary Control Settings:

BAND SELECT	(4): 3.5 to 7.5 mHz
CENTER FREQ	Tune dial to 3.500 mHz

3-93. Equipment Required. Electronic counter. Systron Donner Model 7018, or equivalent. See figure 3-10 for setup.

3-94. Procedure:

a. Connect counter to 1ST LO OUTPUT connector located on rear panel of 806S converter.

b. Set BAND SWITCH to band number 4.

c. Set CENTER FREQ tune dial to 3.500 mHz.

d. Record counter reading.

e. Repeat for the frequencies indicated in the test chart. Frequency accuracy shall be within limits specified in test chart.

3-95. TUNING HEAD STABILITY. Specification requirements: Table 3-1, item 4.

3-96. Description. An electronic counter is used to monitor the frequency of the first local oscillator. Drift measurements are made over a 5-minute period after warmup.

3-97. Preliminary Control Settings:

BAND SELECT	(3): 1.5 to 3.5 mHz
CENTER FREQ	Tune dial to 2.50 mHz

3-98. Equipment Required. Electronic counter Systron Donner Model 7018, or equivalent. See figure 3-10 for setup.

3-99. Procedure:

a. Connect counter to 1ST LO OUTPUT connector located on rear panel of 806 converter.

b. Set BAND SELECT to band number 3 and tune CENTER FREQ dial to 2.50 mHz. Allow the instrument to stabilize for a period of one hour.

c. Read the frequency from the counter every minute for a total of 5 minutes and record on the test chart. Frequency shall be within limits specified on test chart.

3-100. IMAGE REJECTION. Specification requirements: Table 3-1, item 13.

3-101. Description. A signal at the first 500 kHz IF is used as a reference amplitude. A signal is injected at 980 kHz. (500 kHz plus twice the second IF of 240 kHz). The image rejection is then directly observed on the display CRT which is directly calibrated in db.

3-102. Control Settings:

(710B)	
SWEEP TIME	AUTO
SYNC	INT
(800B)	
IF BANDWIDTH	AUTO
GAIN ADJUST	CAL
IF ATTENUATOR	Out
VID FLTR	OFF
IF RESPONSE	LOG
SCAN WIDTH	1.0 KHZ/cm
CENTER FREQUENCY	2500 HZ
DIAL MULT	Any position
INPUT SENSITIVITY	Any position
INPUT IMPEDANCE	Any position

Control Settings (Con't)

INPUT selector toggle	240 KHZ
(806 Converter)	
CENTER FREQ	500 KHZ
BAND SELECT	(1) : 0 to 500 kHz
INPUT ATTENUATOR	Out
IMPEDANCE selector	50 ohms
CALIBRATE switch	OFF
OUTPUT selector toggle	OUT-IF
IF ATTEN toggle	20 DB

3-103. Equipment Required. Signal Generator. Hewlett Packard Model 606B, or equivalent. See figure 3-11 for setup.

3-104. Procedure:

a. Set control settings as indicated.

b. Tune signal generator to 500 kHz.

c. Tune 806S converter to 500 kHz.

d. Switch on the 500 kHz self test signal.

e. Center signal on screen using the CENTER FREQUENCY tune on the 800B.

f. Adjust signal to center of screen with the test oscillator frequency, and adjust the amplitude of the generator for a full scale deflection (7 cm).

g. Tune the test oscillator to 1980 mHz.

h. Note the amplitude response on screen and record on the test chart. Image rejection shall be within limits specified on test chart.

3-105. SENSITIVITY. Specification requirements: Table 3-1, Item 5.

3-106. Description. A known test signal at 2 MHz and 40 MHz is fed into the 806 using the 50 ohm input impedance and operating with a 100 Hz bandwidth. An ac voltmeter monitors the amplitude of the test signal at the input to a calibrated attenuator. The signal level to obtain a 7 cm deflection linear is determined. Minimum measurable signal (S + N)/N = 2 shall also be obtained and the deflection noted.

3-107. Control Settings:

(710B)	
SWEEP TIME	1 sec/cm
SYNC	INT
(800B)	
IF BANDWIDTH	100 Hz
GAIN ADJUST	CAL
IF ATTENUATOR	Out
VID FLTR	OFF
IF RESPONSE	LIN
SCAN WIDTH	100 Hz/cm
CENTER FREQUENCY	2500 Hz
DIAL MULT	Any position
INPUT SENSITIVITY	Any position
INPUT IMPEDANCE	Any position
INPUT selector toggle	240 kHz
(806S Converter)	
CENTER FREQ	2 MHz

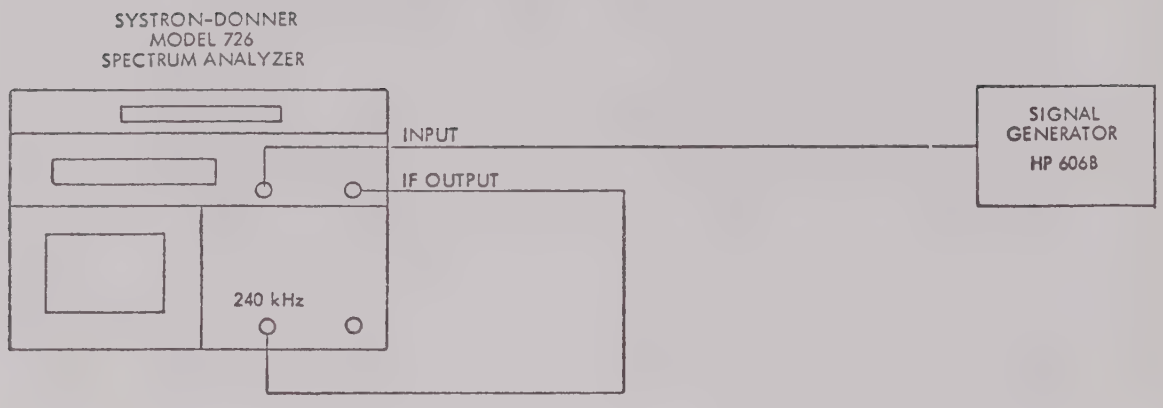


Figure 3-11. Image Rejection Test Setup

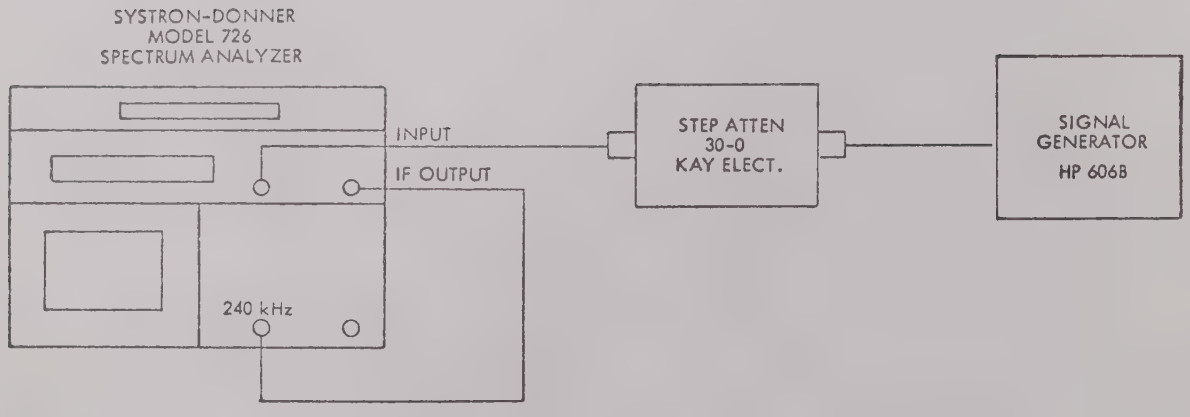


Figure 3-12. Sensitivity Test Setup

Control Settings (Con't)

BAND SELECT	(3) : 1.5 to 3.5 mHz
INPUT ATTENUATOR	Out
IMPEDANCE selector	50 ohms
CALIBRATE switch	OFF
OUTPUT selector toggle	OUTPUT-IF
IF ATTEN toggle	0 DB

3-108. Equipment Required. Signal generator. Hewlett Package 606B, or equivalent. Calibrated attenuator. Kay Electric Model 30-0, or equivalent. See figure 3-12 for setup.

3-109. Procedure:

a. Set controls as indicated.

b. Connect the signal to INPUT connector on 806 converter through the external calibrated attenuator.

c. Turn on the 500 kHz calibrate signal and adjust CENTER FREQUENCY control on the 800B so that signal is centered.

d. Set external attenuator for 0 db attenuation.

e. Adjust frequency of signal generator to 2 mHz and fine tune it so that signal appears in mid screen.

f. Adjust signal amplitude on signal generator for 7 cm deflection.

g. Record the value in microvolts read from signal generator meter.

h. Throw in 20 db in the external attenuator.

i. Adjust signal amplitude on signal generator for 1 cm deflection. Note the reading on generator meter, divide this reading by 10, and record the result in microvolts in the test chart. This shall be equal to or less than the minimum discernible signal.

j. Proceed to 40 mHz and repeat the above procedure. Record the reading in the test chart. Sensitivity in microvolts shall be within limits specified in test chart.

3-110. DYNAMIC RANGE (INTERMODULATION DISTORTION). Specification requirements: Table 3-1, item 9.

3-111. Description. Two tones at frequencies of 3.000 mHz and 3.002 mHz are used to check the distortion level. The level in db is read directly off the screen with the IF response in the log mode.

3-112. Control Settings (Dynamic Range 3 mHz):

(710B)	
SWEEP TIME	AUTO
SYNC	INT
(800B)	
IF BANDWIDTH	AUTO
GAIN ADJUST	CAL
IF ATTENUATOR	Out
VID FLTR	OFF
IF RESPONSE	LOG
SCAN WIDTH	1.0 KHZ/cm
CENTER FREQUENCY	2500 HZ
DIAL MULT	Any position
INPUT SENSITIVITY	Any position
INPUT IMPEDANCE	Any position
INPUT selector toggle	240 KHZ

Control Settings (Con't)

(806 Converter)

CENTER FREQ	3.0 MHz
BAND SELECT	(3) : 1.5 to 3.5 mHz
INPUT ATTENUATOR	11 DB
IMPEDANCE selector	50 ohms
CALIBRATE switch	OFF
OUTPUT selector toggle	OUT-IF
IF ATTEN toggle	20 DB

3-113. Equipment Required. None.

3-114. Procedure:

a. Set controls as indicated.

b. Set self test CALIBRATE to 500 KHz center frequency and adjust frequency tune of 800B so that signal is mid screen.

c. Switch self test CALIBRATE to 3.000/3.002 mHz and adjust CENTER FREQ so that signal is centered on screen.

d. Use INPUT ATTENUATOR to set the signal full screen.

e. The level of intermodulation on signal occurring on either side of signal should be below 70 db on the vertical scale. Record on the test chart. Use INPUT ATTENUATOR to determine the 70 db line.

3-115. INPUT ATTENUATOR ACCURACY. Specification requirements: Table 3-1, item 7.

3-116. Description. An external calibrated attenuator is used to check the instrument attenuators by the substitution method. The linear on-screen display will serve as the indicator.

3-117. Control Settings:

(710B)	
SWEEP TIME	AUTO
SYNC	INT
(800B)	
IF BANDWIDTH	3 KHZ
GAIN ADJUST	CAL
IF ATTENUATOR	20 DB in
VID FLTR	OFF
IF RESPONSE	LIN
SCAN WIDTH	1.0 KHZ/cm
CENTER FREQUENCY	2500 HZ
DIAL MULT	Any position
INPUT SENSITIVITY	Any position
INPUT IMPEDANCE	Any position
INPUT selector toggle	240 KHZ
(806 Converter)	
CENTER FREQ	300 KHz
BAND SELECT	(1) : 0 to 500 kHz
INPUT ATTENUATOR	Out
IMPEDANCE selector	50 ohms
CALIBRATE switch	OFF
OUTPUT selector toggle	OUT-IF
IF ATTEN	20 DB

3-118. Equipment Required. Calibrated Attenuator - 2 required. Kay Electric Model 30-0, or equivalent. Signal Generator. Hewlett Packard 606B, or equivalent. See figure 3-13 for setup.

3-119. Procedure:

a. Set controls as indicated.

b. Connect test oscillator to the external calibrated attenuator. Throw in 70 db in the external attenuator. Connect the output of the attenuator to the signal input of the converter.

c. Set the test oscillator frequency to 300 kHz and tune the 806 converter so that the signal is mid screen.

d. Adjust the amplitude of the signal generator so the signal is 6 cm.

e. Throw out 1 db in the external attenuator while throwing in 1 db in the input attenuator. Note the change on the screen. Record the change on the appropriate place on the chart.

f. Successively throw in 2, 3, 6, 10, 10, 20, 20 db in the attenuator while throwing out the corresponding attenuation in the external calibrated attenuator. Record each change on the chart. All readings shall be within limits on the chart.

g. Throw out 20 db in the IF attenuator on the 806 and throw in 20 db in the external attenuator. Record the difference from the screen. All readings shall be within limits.

3-120. CALIBRATION.

3-121. This heading contains detailed instructions for calibrating the Model 806 converter. A complete calibration shall be performed once every 6 months or every 500 hours of operation. For a complete calibration, make the adjustments in the sequence given in this section, first ensuring that the associated Model 710B/800B Spectrum Analyzer is calibrated.

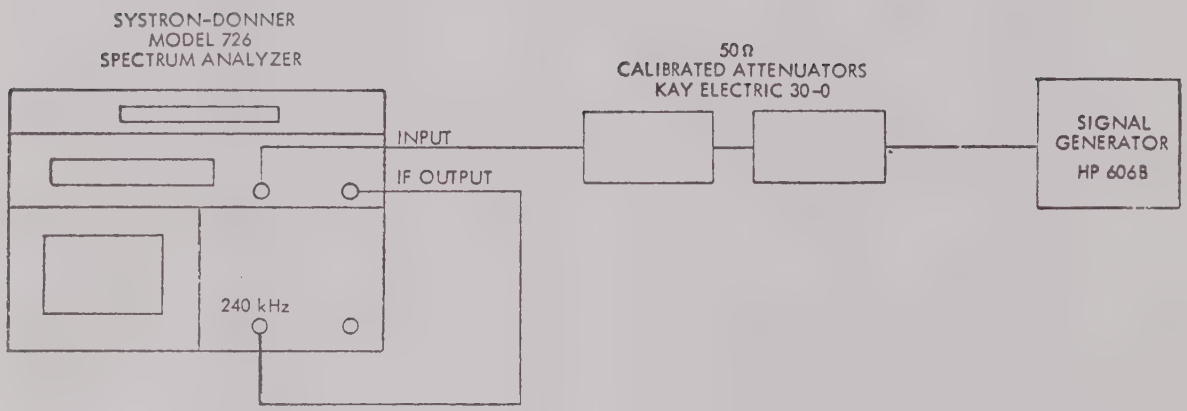


Figure 3-13. Input Attenuator Accuracy Test Setup

Table 3-4. Performance Check Record Form

PARAGRAPH	TEST DESCRIPTION	MEASUREMENT UNITS	MIN.	ACTUAL	MAX.
3-85	RESPONSE FLATNESS AND FREQUENCY RANGE	Amplitude in cm			
	50 kHz		*		*
	250 kHz				
	450 kHz				
	900 kHz				
	1.5 mHz				
	2.0 mHz	*Limits: $\frac{\text{Max. Amplitude (cm)}}{\text{Min. Amplitude (cm)}}$ = 1.59 max.			
	3.5 mHz				
	5.0 mHz	50 kHz to 40.0 mHz: ±2db			
	7.5 mHz				
	10.0 mHz				
	15.5 mHz				
	21.0 mHz				
	31.5 mHz				
	40.0 mHz				
	50.0 mHz				
	60.0 mHz				
	IN-BAND FLATNESS	Amplitude in cm			
	1.0 kHz/cm				
	10 kHz/cm				
		*Limits: $\frac{\text{Max. Amplitude (cm)}}{\text{Min. Amplitude (cm)}}$ = 1.12 max.			
		±0.5db			

$\frac{6+x}{6-x} = 1.59$

$6+x = 1.59(6-x)$

$6+x = 9.54 - 1.59x$

$x + 1.59x = 9.54 - 6$

$2.59x = 3.54$

$x = 1.36$

$\frac{6+x}{6-x} = 1.12$

$6+x = 1.12(6-x)$

$6+x = 6.72 - 1.12x$

$x + 1.12x = 6.72 - 6$

$2.12x = 0.72$

Table 3-4. Performance Check Record Form (Con't)

PARAGRAPH	TEST DESCRIPTION	MEASUREMENT UNITS	MIN.	ACTUAL	MAX.
3-90	TUNING HEAD FREQUENCY ACCURACY	mHz Dial Reading		Counter Reading	
		3.50	3.960		4.040
		3.75	4.208		4.292
		4.00	4.455		4.545
		4.25	4.702		4.798
		4.50	4.950		5.050
		4.75	5.197		5.302
		5.00	5.445		5.555
		5.25	5.692		5.807
		5.50	5.940		6.060
		5.75	6.187		6.312
		6.0	6.435		6.565
		6.5	6.930		7.070
		7.0	7.425		7.575
		7.5	7.920		8.080
3-95	TUNING HEAD STABILITY	mHz, minutes	Counter Reading		Difference Frequency
	Time (minutes)			*	
	00	*Limits: Max. difference between read-			
	1.0	ings - 3.6 Hz			
	2.0				
	3.0				
	4.0				
	5.0				

Table 3-4. Performance Check Record Form (Con't)

PARAGRAPH	TEST DESCRIPTION		MEASUREMENT UNITS	MIN.	ACTUAL	MAX.
3-100	IMAGE REJECTION		db		Image rejection with respect to 0 db reference line	
				70 db		db
3-105	SENSITIVITY		dbm	microvolts		
	2 mHz	Min. Discernible Signal	-125	<0.128 uV		
		1 cm Deflection		<0.5 uV		
		Full Scale Deflection (7 cm)		<5.0 uV		
	40 mHz	Min. Discernible Signal	-125	<0.128 uV		
		1 cm Deflection		<0.5 uV		
		Full Scale Deflection (7 cm)		<5.0 uV		
3-110	DYNAMIC RANGE		db			
	3.000/3.002 mHz			70 db down		

Table 3-4. Performance Check Record Form (Con't)

PARAGRAPH	TEST DESCRIPTION	MEASUREMENT UNITS	MIN.	ACTUAL	MAX.
3-115	INPUT ATTENUATOR ACCURACY Attenuator Steps db	db			
	1.0		0.95		1.05
	2.0		1.85		2.15
	3.0		2.7		3.3
	6.0		5.4		6.6
	10.0		8.9		11.1
	10.0		8.4		11.6
	20.0		17.4		22.6
	20.0		16.4		23.6

Table 3-5. Converter Adjustments

ADJUSTMENT	REFERENCE DESIGNATION	LOCATION	PROCEDURE (PARAGRAPH NO.)
500 kHz filter	L1 through L5	PCB306	3-123
240 kHz filter	L1 through L6	PCB305	3-125
5 kHz oscillator	R21	PCB301	3-127
500 kHz oscillator	L3	PCB301	3-129
3.000/3.002 mHz oscillator	L1, L2, R8, R10	PCB301	3-131
2nd L.O. level	R27, C17	PCB304	3-133
2nd L.O. filter	L3	PCB304	3-135
740 kHz crystal oscillator	L1	PCB304	3-137
740 kHz center frequency	R2	PCB 304	3-139
100 kHz scan width	R3	PCB304	3-141
AGC level	R14	PCB307	3-143
Master Oscillator		A301	3-145
Low frequency	C7		
High frequency	C2		
Doubler Divider		A302	3-147
Band: 0.5 - 1 mHz	L13		
1 - 2 mHz	L12		
2 - 4 mHz	L11, C35		
4 - 8 mHz	L10, C34		
8 - 16 mHz	L9, C33		
16 - 32 mHz	L8, C28		
32 - 64 mHz	L7, C32		
Signal gain	R2	PCB305	3-149

3-122. The Model 806 adjustments are listed in table 3-5. All of the adjustments require removal of covers from the assembly boxes or circuit boards. See figure 3-8 for location of referenced components and adjustments.

3-123. 500 kHz FILTER ADJUSTMENT (PCB306). Required equipment includes:

a. Sweeping signal generator, Hewlett Packard Model 675a, or equivalent.

b. Signal generator, Hewlett Packard Model 606B, or equivalent.

c. Electronic counter, Systron Donner Model 7018, or equivalent.

d. Oscilloscope, Tektronix Model 545, or equivalent.

e. Power supply, 12 Vdc.

3-124. Procedure (see figure 3-14 for setup). For proper alignment, the 500 kHz filter board (PCB306) must be removed from the 806 converter. Carefully unsolder all leads from board and remove board by unscrewing four posts. Then proceed as follows·

a. Connect positive terminal of 12 Vdc power supply to pin 3 and negative terminal to ground. Connect pin 4, the filter output, to the vertical input terminal of the oscilloscope. Connect the sweeping signal generator output to pin 1, the input terminal.

b. Set the 675a sweeping signal generator controls to

Function	F_o/F
F Width	200 kHz
Sweep Mode	Auto
F_o/Cw adj	500 kHz
Output level	-41 dbm

c. Connect horizontal output of sweeping signal generator to horizontal input terminal of oscilloscope.

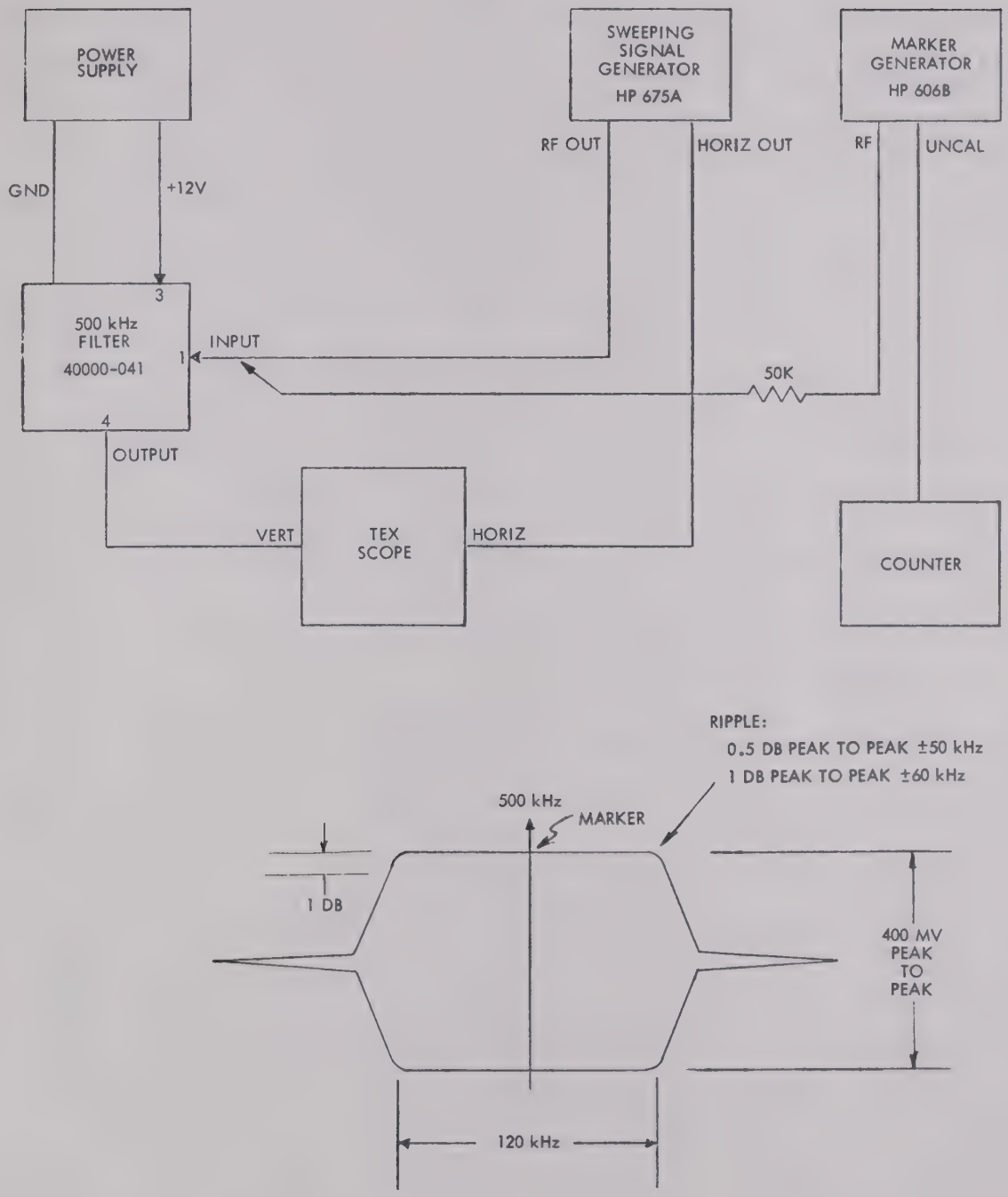


Figure 3-14. 500 kHz Filter Adjustment Setup

d. Feed the 606B signal generator to terminal 1 of 500 kHz filter board through a 50 kilohm resistor. Set frequency of 606B to 500 kHz, using the frequency counter. A birdie should appear on the screen of scope indicating the center frequency point that filter should be aligned to. The peak to peak output should be about 400 mV.

e. Tune inductors L1, L2, L3, L4, L5 for a maximally flat response, centered at 500 kHz. The amplitude ripple for the 100 kHz width should be equal or less than 0.5 db peak to peak, and the 120 kHz width ripple should be equal or less than 1 db peak to peak.

3-125. 240 kHz FILTER ADJUSTMENT (PCB 305). Required equipment includes·

a. Sweeping signal generator, Hewlett Packard Model 675a, or equivalent.

b. Signal generator, Hewlett Packard Model 606B, or equivalent.

c. Electronic counter, Systron Donner Model 7018, or equivalent

d. Oscilloscope, Tektronix Model 545, or equivalent

e. Power supply, 12 Vdc

3-126. Procedure (see figure 3-15 for setup). For proper alignment, the 240 kHz filter board (PCB305) must be removed from the 806 converter. Carefully unsolder all leads from board and remove board by unscrewing four posts. Then proceed as follows:

a. Connect positive terminal of 12 Vdc power supply to pin 2 and negative terminal to ground. Connect pin 3, the filter output to the vertical input terminal of the oscilloscope. Connect output of sweeping signal generator to pin 1, the input terminal.

b. Set the 675a sweeping generator controls to

Function	F_o/ F
F Width	100 kHz
Sweep Mode	Auto
F_o/CW adj	240 kHz
Output level	-31 dbm.

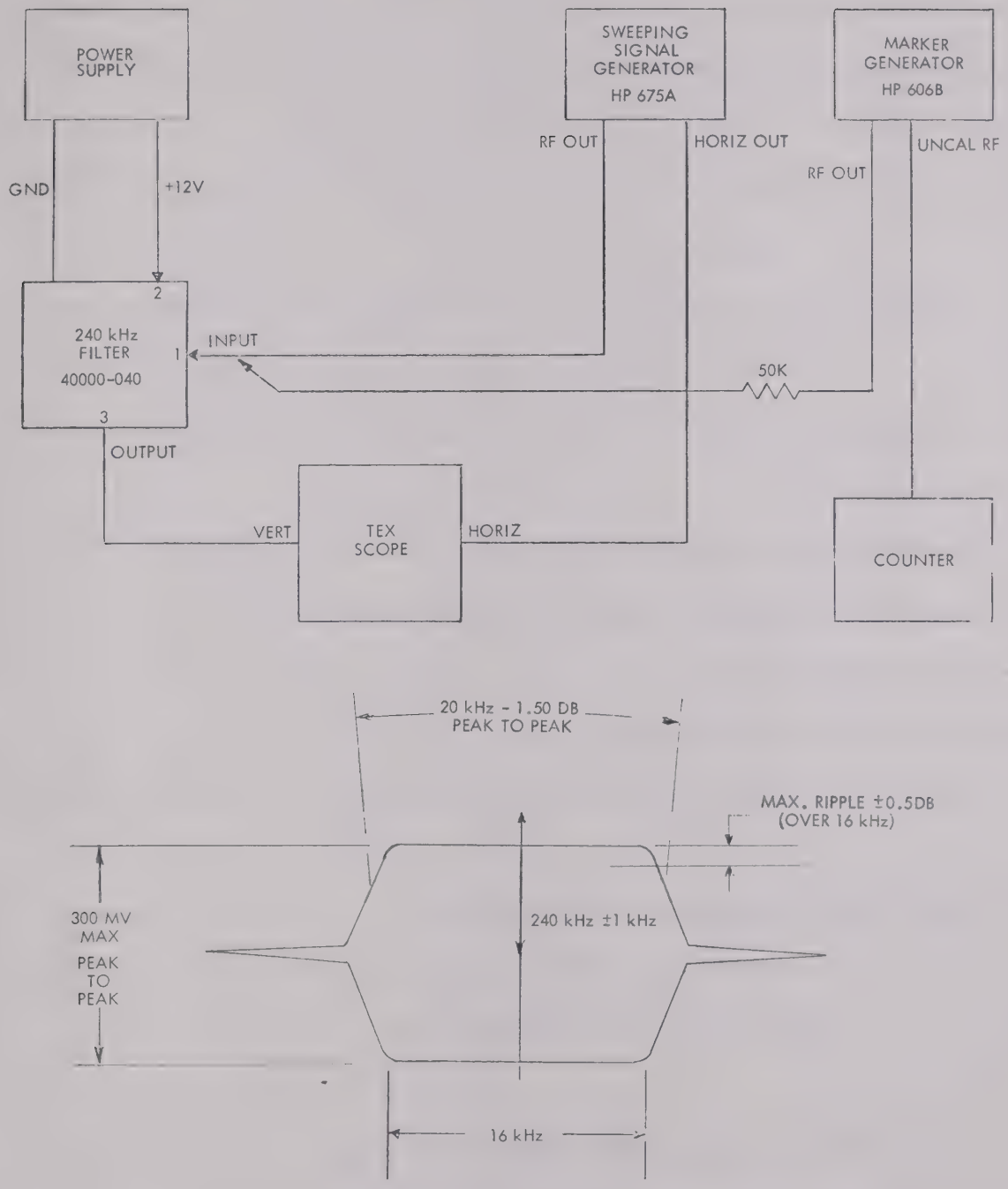


Figure 3-15. 240 kHz Filter Adjustment Setup

c. Connect horizontal output of sweeping signal generator to horizontal input terminal of oscilloscope.

d. Feed the 606B signal generator to terminal 1 of 240 kHz filter through a 50 kilohm resistor. Set frequency of 606B to 500 kHz, using the frequency counter. A birdie should appear on screen of scope indicating the center frequency point that filter should be aligned to.

e. Tune inductors L1, L2, L3, L4, L5, L6 for maximally flat response, centered at 240 kHz. The 16 kHz bandwidth amplitude ripple should be less than 0.5 db peak to peak.

f. Turn the Gain pot R2 for minimum gain. The peak to peak output of the response should be about 300 mV.

3-127. 5 kHz OSCILLATOR ADJUSTMENT (PCB 301). Required equipment: Electronic counter, Systron Donner Model 7018, or equivalent.

3-128. Procedure.

a. Set CALIBRATE switch to the 500 KHZ +5 KHZ position.

b. Adjust slug of L3 to the extreme clockwise position to turn off the 500 kHz oscillator.

c. Monitor the collector of Q1 with the frequency counter.

d. Adjust R21 so that frequency reads 5,000 Hz.

3-129. 500 kHz OSCILLATOR ADJUSTMENT (PCB301). Required equipment: Electronic counter, Systron Donner Model 7018, or equivalent.

3-130. Procedure.

a. Set CALIBRATE switch to the 500 KHZ position.

b. Monitor the collector of Q1 with the frequency counter.

c. Adjust L3 so that frequency reads 500,000 Hz.

3-131. 3.000/3.002 mHz OSCILLATOR ADJUSTMENT (PCB301). Required equipment:

a. Electronic counter, Systron Donner Model 7018, or equivalent.

b. Calibrated oscilloscope, Tektronix Model 545, or equivalent, with high impedance probe.

3-132. Procedure.

a. Set CALIBRATE switch to the 3.000/3.002 MHZ position.

b. Monitor the 3.000 mHz oscillator at the emitter of Q5 with the frequency counter.

c. Adjust L1 so that frequency reads 3.000 mHz.

d. Monitor the 3.002 mHz oscillator at the emitter of Q6 with the frequency counter.

e. Adjust L2 so that frequency reads 3.002 mHz.

f. Monitor pin 1 on the PC board, using high impedance probe of oscilloscope.

g. Adjust R8 and R10 so that the two tone signal is exactly 200 mV peak to peak on the oscilloscope, and signals are equal amplitude on the 710B/800B analyzer screen.

3-133. SECOND LOCAL OSCILLATOR LEVEL ADJUSTMENT (PCB304). Required equipment: oscilloscope with 10 meg ohm, 5 picofarad impedance probe.

3-134. Procedure.

a. Monitor the collector of Q4 with the high impedance scope probe. Adjust R27 for minimum signal amplitude on the scope.

b. Adjust C17 so that signal amplitude peaks.

c. Set SCAN WIDTH for 10 Hz/cm.

d. Adjust R27 so that peak to peak signal level is set at 17 volts.

3-135. SECOND LOCAL OSCILLATOR FILTER ADJUSTMENT (PCB304). Required equipment: none.

3-136. Procedure.

a. Set 710B/800B controls as follows:

SCAN WIDTH	10 KHZ/cm
IF RESPONSE	LIN
IF BANDWIDTH	500 HZ

b. Set controls of 806 converter as follows:

CALIBRATE	500 KHZ CF
OUT-IF-ATTN	20 DB

c. Calibrate the center frequency of the analyzer using the 500 kHz tone, adjusting FREQUENCY TUNE dial on the 800B so that signal is centered on screen.

d. Switch the CALIBRATE signal to 3.000/3.002 MHZ position.

e. Tune CENTER FREQ dial of 806 to 3.00 mHz for a signal presentation on screen.

f. Throw in about 60 db of attenuation in the INPUT ATTENUATOR of the 806. The signal should appear about 6 cm high.

g. Vary the fine tune of the center frequency till the 3.002 signal appears at the 0 cm position.

h. Adjust L3 for a peak in the signal amplitude.

3-137. 740 kHz CRYSTAL OSCILLATOR ADJUSTMENT (PCB304). Required equipment: oscilloscope with high impedance probe.

3-138. Procedure.

a. Monitor the signal at junction of C13 and C12 of crystal oscillator with a scope using a high input impedance probe.

b. Adjust L1 for a peak of the signal amplitude.

3-139. 740 kHz CENTER FREQUENCY ADJUSTMENT (PCB304). Required equipment: none.

3-140. Procedure.

a. Set SCAN WIDTH of the analyzer to 1.0 KHZ/cm.

b. Using the CALIBRATE signal at 500 KHZ CF, adjust CENTER FREQUENCY dial on 800B so that signal is centered.

c. Set SCAN WIDTH control to 10 KHZ/cm.

d. Adjust R2 so that signal is centered on screen.

3-141. 100 kHz SCAN WIDTH ADJUSTMENT (PCB304). Required equipment: none.

3-142. Procedure.

a. Set CALIBRATE switch to 500 KHZ +5 KHZ position.

b. Set SCAN WIDTH control to 5 KHZ/cm.

c. Adjust R3 so that one marker appears every cm on screen.

d. Readjust R2 as necessary to maintain signal centered on screen.

3-143. AGC LEVEL ADJUSTMENT (PCB307). Required equipment: oscilloscope, Tektronix Model 545, or equivalent.

3-144. Procedure.

a. Set BAND SELECT of the 806 to band (1).

b. Monitor signal amplitude of the 1st L.O. signal at the junction of R18 and CR2 with the oscilloscope.

c. Adjust AGC level R14 so that the peak to peak signal amplitude is 2.5 volts.

3-145. MASTER OSCILLATOR ADJUSTMENT (PCB301). Required equipment: electronic counter, Systron Donner Model 7018, or equivalent.

3-146. Procedure.

a. Set BAND SELECT of the 806 to band (4).

b. Adjust CENTER FREQ of the 806 to 3.5 mHz on the dial.

c. Monitor the 1st L.O. output with the frequency counter.

d. Adjust C7 so that the frequency reads 4.00 mHz on the counter. If the frequency cannot be set as required, disengage dial readout drive from tuning capacitors by loosening screws holding mechanical coupling to the readout. Adjust pointer position manually by rotating coupling so that dial reads 3.50 mHz. Adjust CENTER FREQ dial so that frequency counter reads 4.00 mHz. Tighten coupling to dial.

e. Tune CENTER FREQ dial to 7.5 mHz.

f. Adjust C2 so that frequency reading of counter is 8.00 mHz.

3-147. DOUBLER DIVIDER BAND ADJUSTMENT (A302). Required equipment: DC voltmeter.

3-148. Procedure.

a. Set BAND SELECT 806 to band (1).

b. Set CENTER FREQ to read 0 KHZ.

c. Connect positive terminal of voltmeter to AGC input on doubler divider assembly. Ground negative terminal of voltmeter.

d. Adjust L13 so that voltmeter reading is at a minimum.

e. Set BAND SELECT to band (2) and with the dial reading at 500 KHZ, adjust L12 for a null in the voltmeter reading.

f. Set BAND SELECT to band (3) and pointer at the extreme left of dial. Adjust L11 for a null in the voltmeter reading.

g. Set CENTER FREQ on the dial to 3.5 MHZ.

h. Adjust C35 for a minimum on the voltmeter. Go back and check the low end of the dial, and if necessary readjust L11 for a null voltmeter reading. Recheck the high end of the dial.

i. Proceed to each band, adjusting the respective inductors (see table 3-5), first at the low end of the dial for a voltmeter minimum, and then adjusting the respective capacitors (see table 3-5) at the high end of the band.

3-149. SIGNAL GAIN ADJUSTMENT (PCB305). Required equipment: signal generator, Hewlett Packard Model 606B, or equivalent.

3-150. Procedure.

a. Set signal generator frequency to 3 mHz and amplitude to -65 dbm.

b. Feed this signal into the 806 input.

c. Set controls as follows:

IF RESPONSE	LOG
INPUT ATTENUATOR	0 DB
IF ATTENUATOR	0 DB
CENTER FREQ	3.0 MHZ
SCAN WIDTH	1.0 KHZ/cm
IF BANDWIDTH	100 HZ

d. The signal should appear on screen. Adjust R2 so that signal amplitude is full screen (7 cm).

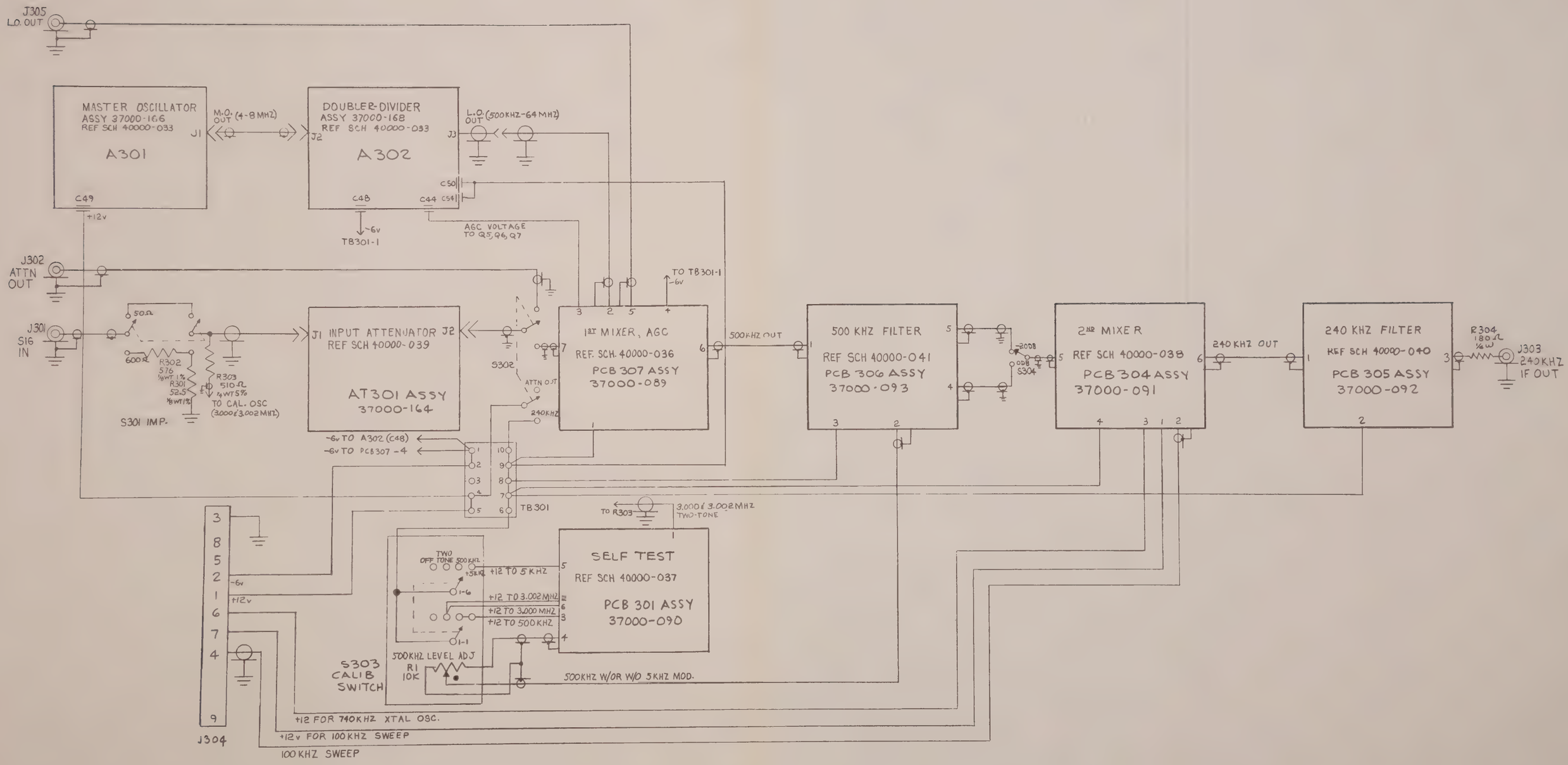


Figure 3-16. 806 Converter Schematic

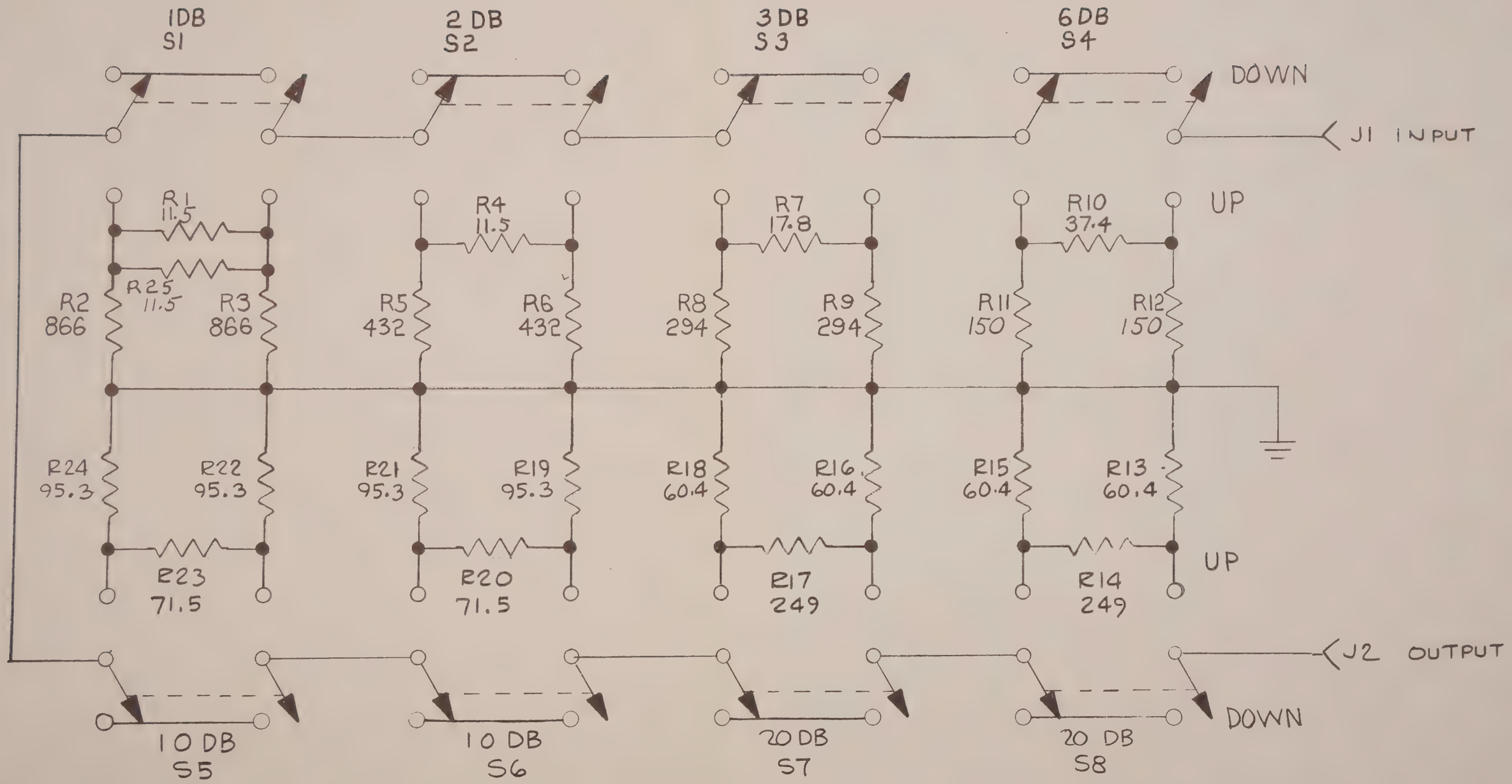
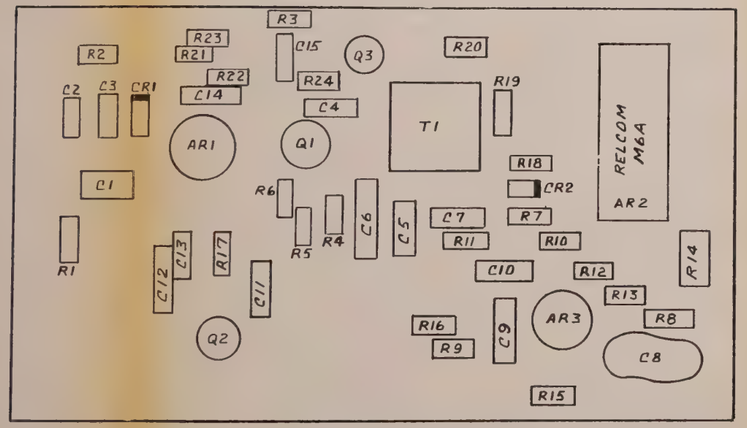
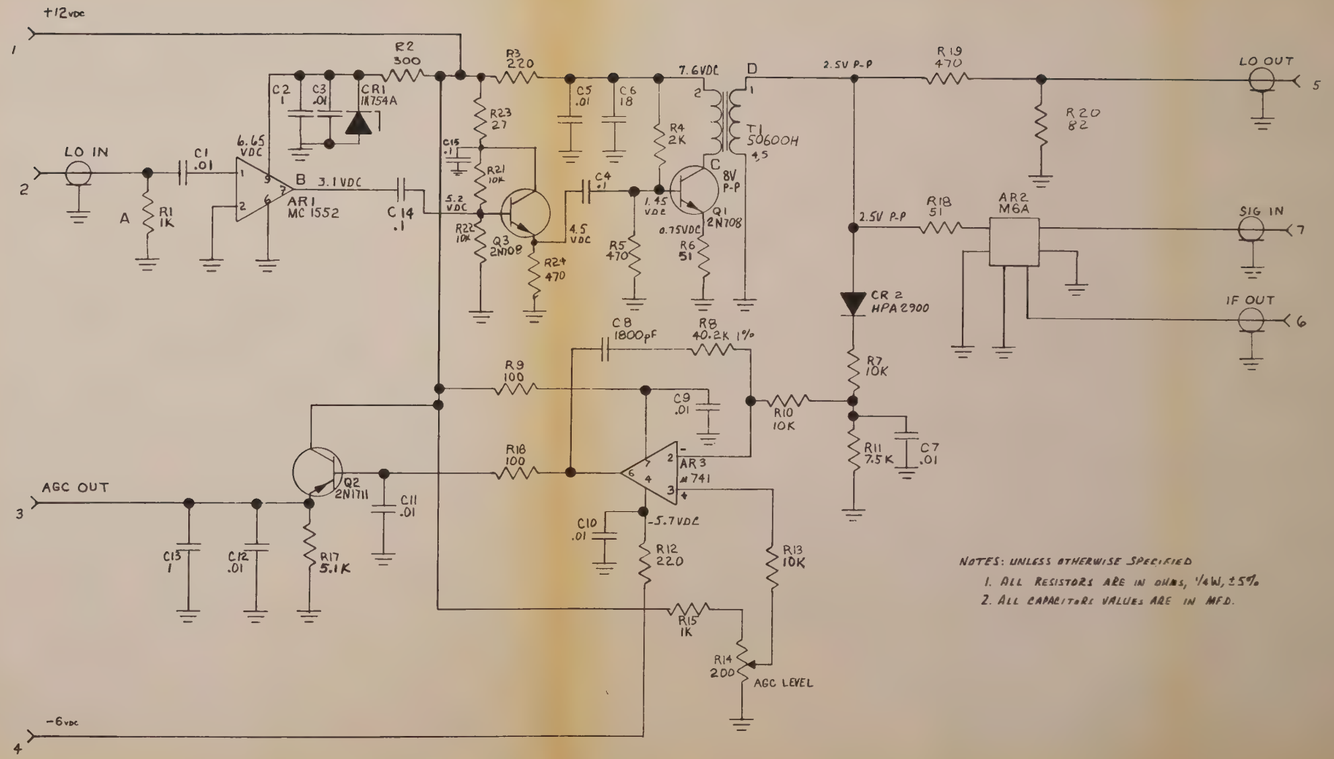


Figure 3-17. AT301 Input Attenuator Schematic





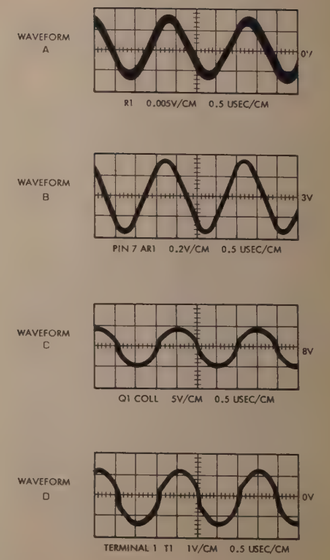
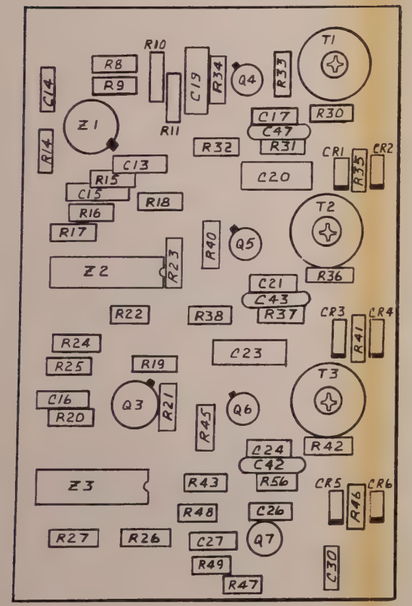
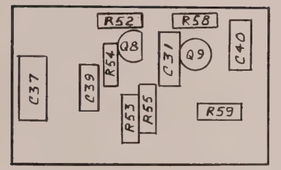
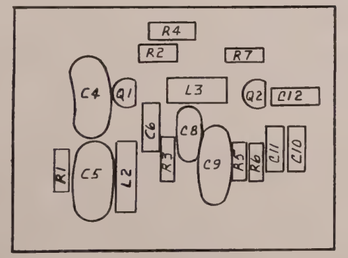
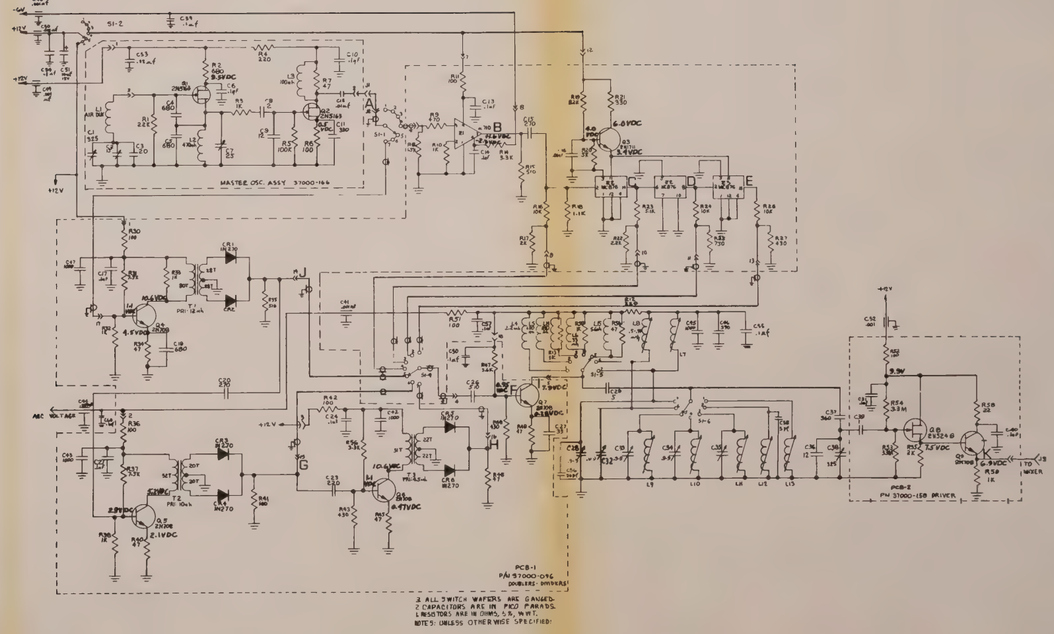


Figure 3-18. First Mixer-AGC Schematic









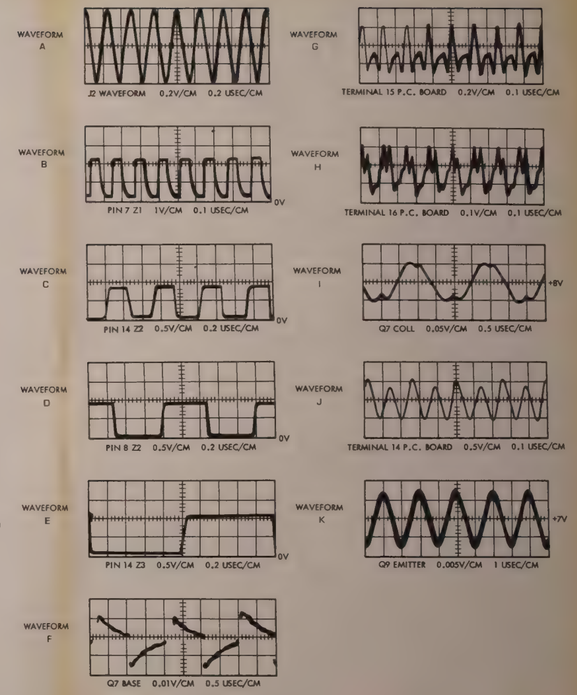
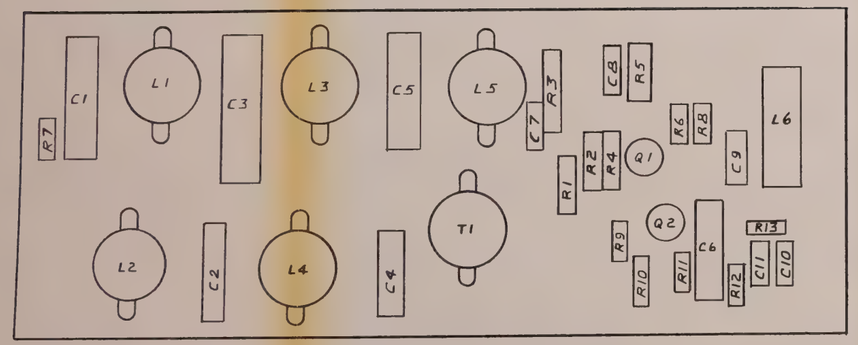
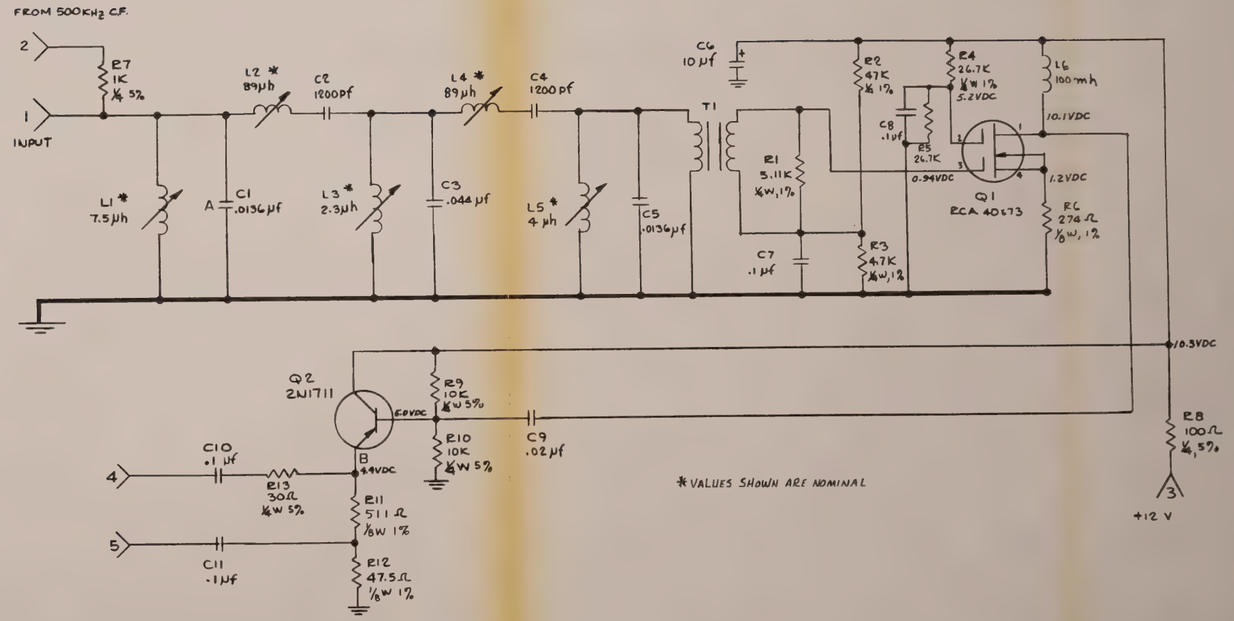
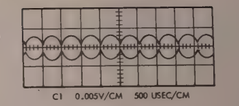


Figure 3-19. A301 Master Oscillator, A302 Doubler Divider Schematic







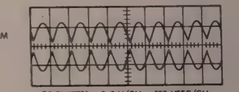
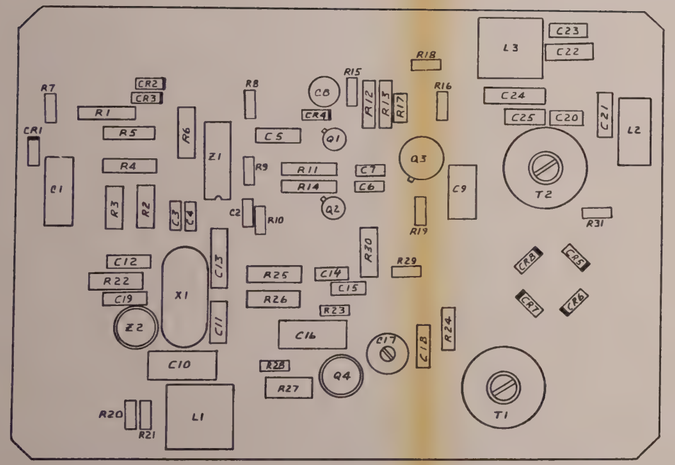
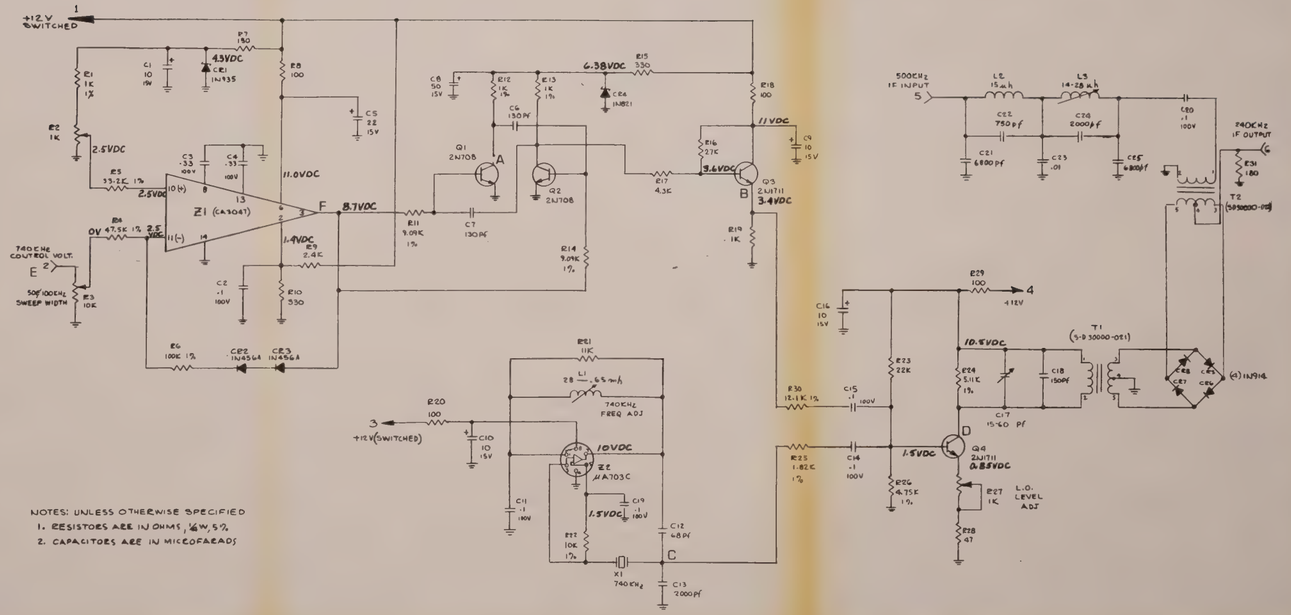


Figure 3-20. 500 kHz Filter Schematic





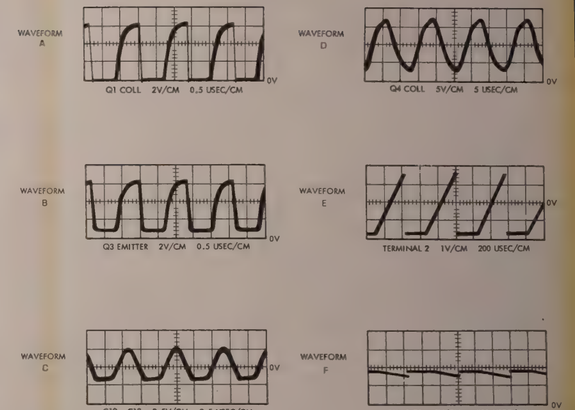
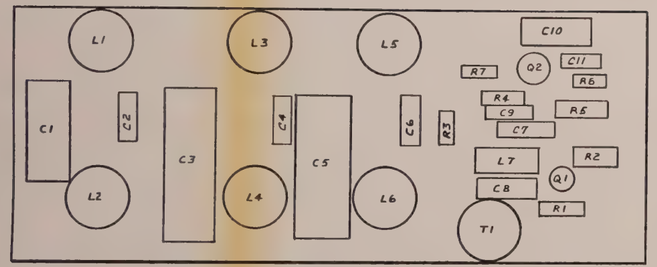
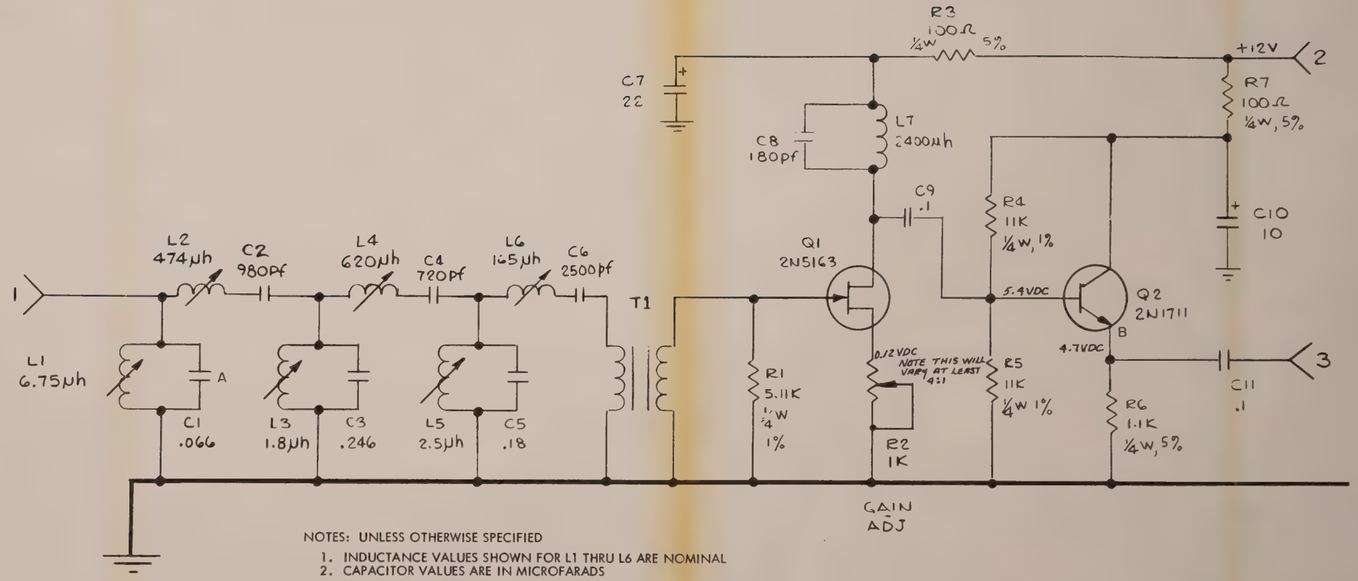


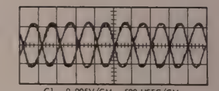
Figure 3-21. Second Mixer Schematic





NOTES: UNLESS OTHERWISE SPECIFIED

1. INDUCTANCE VALUES SHOWN FOR L1 THRU L6 ARE NOMINAL
2. CAPACITOR VALUES ARE IN MICROFARADS



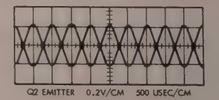
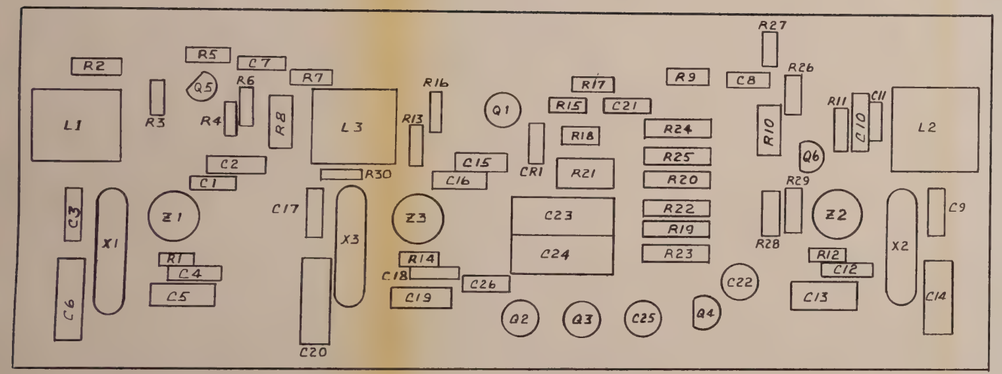
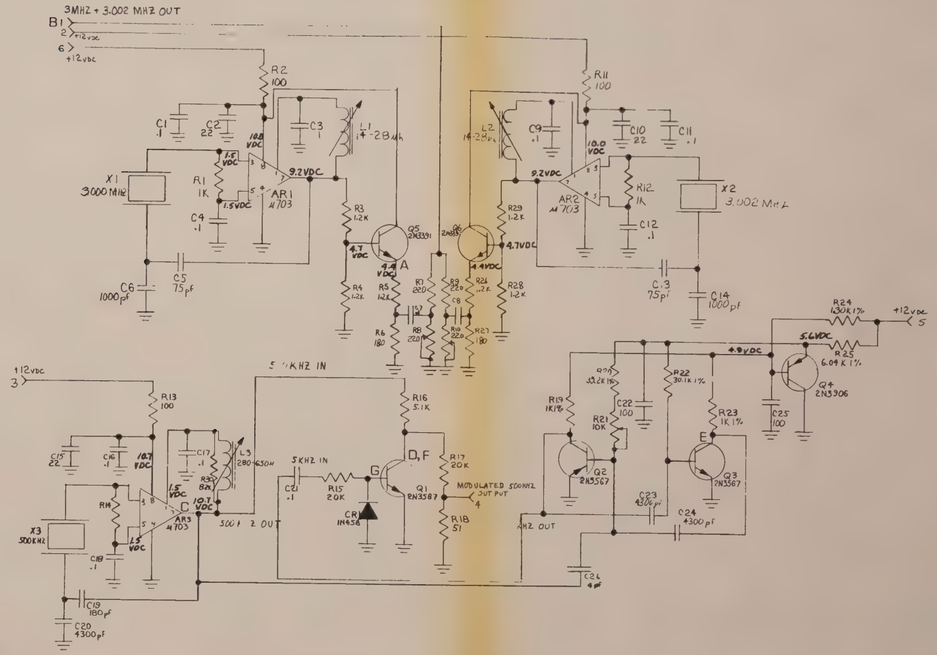


Figure 3-22. 240 kHz Filter Schematic





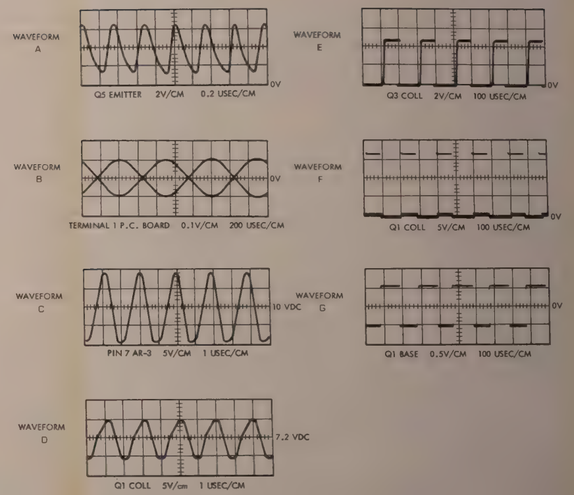


Figure 3-23. Self-Test Board Schematic

SECTION VI
PARTS LIST

3-151. INTRODUCTION.

3-152. This section provides information necessary to procure all parts of the equipment having maintenance significance.

3-153. COLUMN HEADINGS. Columns in the Parts List cover identifying characteristics of each item as described in the following paragraphs.

3-154. Figure and Index Number. Significant parts which do not carry an electronic reference designation are given an index number, associated with the respective figure number in this column.

3-155. Reference Designation. Electronic parts are listed by their reference designations in this column and indicated on the respective illustration by reference designation.

3-156. Systron-Donner Part Number. Part numbers assigned by Systron-Donner are listed in this column.

3-157. Manufacturer's Part Number. Part numbers of items not manufactured by Systron Donner are listed in this column; the corresponding Federal Supply Code for Manufacturers (Vendor Codes) are listed in parenthesis following the nomenclature of the part. Circuit components not otherwise identified carry the applicable Military Specification codings for characteristics and values.

3-158. Description. Nomenclature of the part is indented in this column to designate assemblies, sub-assemblies, and detail parts. Attaching parts are listed below the respective item to which they pertain; attaching parts do not carry index numbers.

3-159. Quantity. Entries in this column show the number of units of an item required per assembly containing the item.

3-160. VENDOR's CODES. Approved vendor's codes, as listed in Federal Cataloging Handbook H4-1, are used in this parts list. Items manufactured by Systron-Donner, and standard parts, are not normally provided with vendor's codes.

Code	Vendor's Name and Address
01121	Allen-Bradley Co. 2411-15 W Fayete St. Baltimore, Maryland 21223
01220	Systron-Donner Corp. Microwave Division 14844 Oxnard St. Van Nuys, California
01295	Texas Instrument, Inc. Semiconductor Components Division North Central Expressway Dallas, Texas 75231
02735	R. C. A. Corp. Solid State and Receiving Tube Division Route 202 Somerville, New Jersey 08876
02799	Arco Capacitors, Inc. Division of Arco Electronics Los Angeles, California
03508	General Electric Co. Semi-Conductor Products Dept. Electronics Park Syracuse, New York 13201
04713	Motorola Semiconductor Products, Inc. 5005 East McDowell Rd. Phoenix, Arizona 85008
05292	ITT Components Division Clifton, New Jersey
07263	Fairchild Camera and Inst. Corp. Semiconductor Division 313 Frontage Rd. Mountain View, California

Code	Vendor's Name and Address
12603	Clark Equipment Co. 324 E. Dewey Buchanan, Michigan 49107
27956	RELCOM 2164 E. Middlefield Rd. Mountain View, California 94040
28480	Hewlett-Packard Co. 1501 Page Mill Rd. Palo Alto, California 94304
37942	P. R. Mallory and Co., Inc. 3029 E. Washington St. Indianapolis, Indiana 46206
43543	Nytronics, Inc., Transformer Division 3rd Avenue Alpha, New Jersey 08866
49956	Raytheon Co. Lexington, Massachusetts 02173
56289	Sprague Electric Co. North Adams, Massachusetts 01247
72136	Electro Motive Mfg. Co., Inc. South Park and John St. Willimantic, Connecticut 06226
72982	Erie Technological Products, Inc. 644 W. 12th St. Erie, Pennsylvania 16512
73138	Beckman Instruments, Inc. Helipot Division 2500 Harbor Blvd. Fullerton, California 92634
73899	JFD Electronics Co., a Division of Stratford Retreat House 15th at 62nd St. Brooklyn, New York 11219

Code	Vendor's Name and Address
76487	James Millen Mfg. Co., Inc. 150 Exchange St. Malden, Massachusetts 02148
76561	Moorlee Manufacturing Co. 120 W. Slauson Ave. Los Angeles, California 90003
78189	Illinois Tool Works, Inc. Shakeproof Division St. Charles Rd. Elgin, Illinois 60126
79963	Zierick Mfg. Co. Radio Circle Mt. Kisco, New York 10549
80131	Electronic Industries Ass'n 2001 Eye Northwest St. Washington, D.C. 20006
80583	Hammarlund Mfg. Co. 73-88 Hammarlund Dr. Mars Hill, North Carolina 28754
83125	General Instrument Corp. Capacitor Division Darlington, South Carolina 29532
83330	Smith Herman H., Inc. 812 Snediker Ave. Brooklyn, New York 11207
85605	Keps Electric Co. Pittsburgh, Pennsylvania
90201	Mallory Capacitor Co. 3029 East Washington St. P.O. Box 372 Indianapolis, Indiana 46206
91836	Kings Electronics Co., Inc. 40 Marbledale Rd. Tuckahoe, New York 11223

Code	Vendor's Name and Address
94680	U.S. Electronics Corp. 277 Warren St. Lyndhurst, New Jersey 07071
95146	Alco Electronics Products, Inc. P.O. Box 1348 Lawrence, Massachusetts 01843
96493	Paperlynen Co. 555 W. Goodale Columbus, Ohio 43216

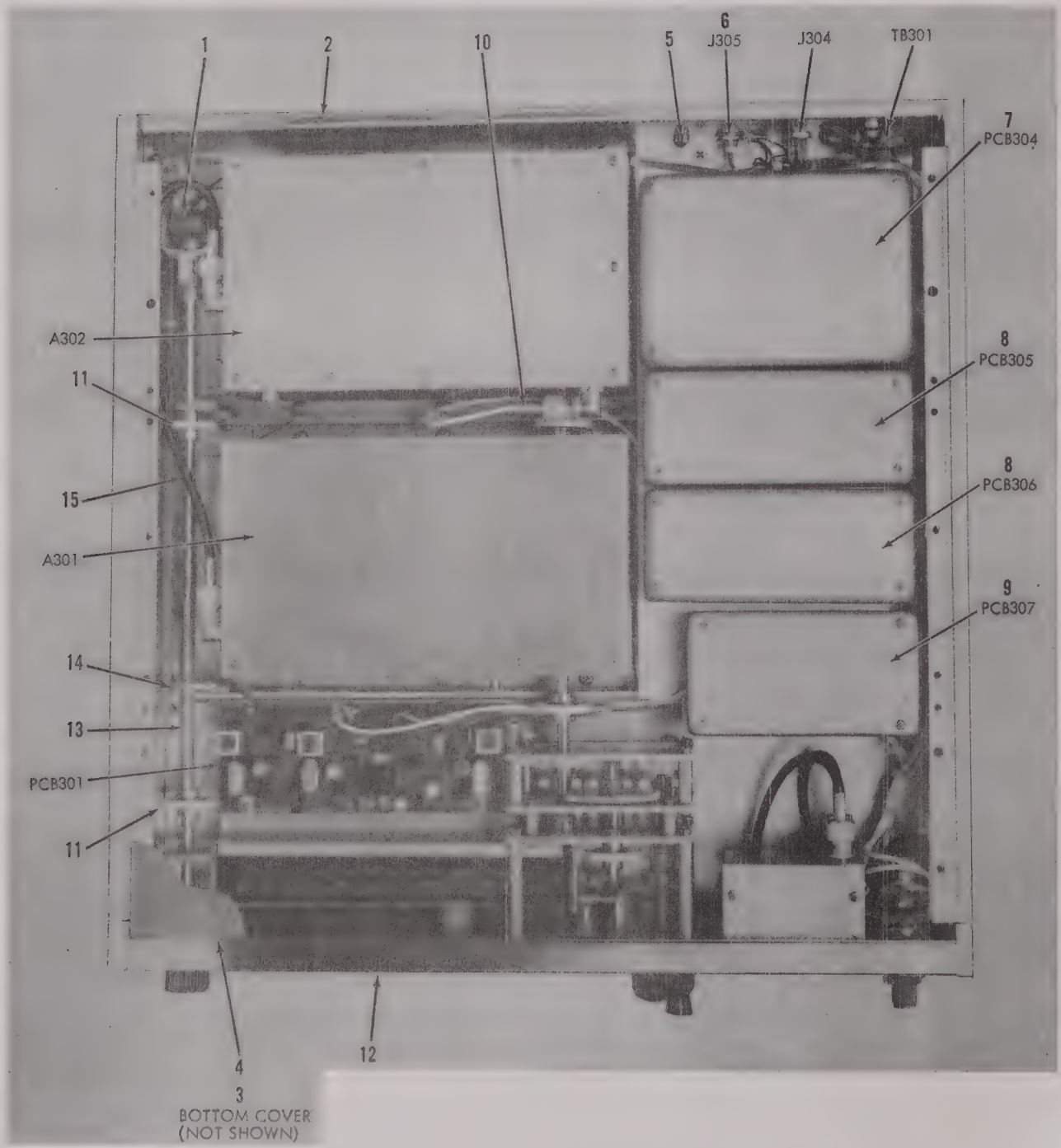


Figure 3-24. Converter Assembly

Table 3-6. Converter Assembly, Parts List

FIG. & INDEX NO.	REF DESIG	PART NUMBER		DESCRIPTION	QTY
		SYSTRON-DONNER	MFR	1 2 3 4 5 6 7	
3-24		37000-161		CONVERTER ASSY	REF
	A301	37000-166		. MASTER OSCILLATOR ASSY (see table 3-7 for breakdown)	1
	A302	37000-168		. DOUBLER DIVIDER ASSY (see table 3-8 for breakdown)	1
				(ATTACHING PARTS)	
		16510-312	MS511957-42	. SCREW	12
		16730-008	MS35337-80	. LOCKWASHER	12
				---*---	
	J304	15010-057	M24308/3-1	. CONNECTOR, Power In	1
				(ATTACHING PARTS)	
		15550-088	D24418-2	. SCREWLOCK ASSY, Female (05292)	2
				---*---	
	J305	15050-000	KC79-35	. CONNECTOR, BNC (91836)	1
	PCB301	37000-090		. BOARD ASSY, Self Test (see table 3-9 for breakdown)	1
				(ATTACHING PARTS)	
		15550-102	8826	. SPACER, Hex (83330)	6
		16740-004	MS15795-803	. WASHER	6
		16321-375	MS51957-15	. SCREW	12
		16730-004	MS15795-803	. LOCKWASHER	12
				---*---	
	PCB304	37000-091		. BOARD ASSY, 740 KHZ Oscillator (see table 3-10 for breakdown)	1
	PCB305	37000-092		. BOARD ASSY, 240 KHZ Filter (see table 3-11 for breakdown)	1
	PCB306	37000-093		. BOARD ASSY, 500 KHZ Filter (see table 3-12 for breakdown)	1
	PCB307	37000-089		. BOARD ASSY, Mixer AGC (see table 3-13 for breakdown)	1
				(ATTACHING PARTS)	
		15550-095	8401	. SPACER, Hex, 1/4 In. Lg (83330)	16
		15550-100	8407	. SPACER, Hex, 1 In. Lg (83330)	16
		16321-625	MS51957-18	. SCREW	16
		16730-004	MS35337-78	. LOCKWASHER	32
		16740-004	MS15795-803	. WASHER	16
				---*---	
	TB301	16800-001	2200B	. TERMINAL BOARD (94680)	1
				(ATTACHING PARTS)	
		15550-094	8400	. SPACER, Hex (83330)	2
		16321-437	MS51957-16	. SCREW	2
		16710-004	4-40	. NUT, Keps (85605)	2
				---*---	
					1

Table 3-6. Converter Assembly, Parts List (Con't)

FIG. & INDEX NO.	REF DESIG	PART NUMBER		DESCRIPTION 1 2 3 4 5 6 7	QTY
		SYSTRON-DONNER	MFR		
3-24					
1		32000-251		. DRIVE, Modified	1
2		32000-253		. REAR PANEL	1
				(ATTACHING PARTS)	
		16410-250	MS51957-26	. SCREW	4
		16730-006	MS35337-79	. LOCKWASHER	4
				---*---	
3		32000-396		. BOTTOM COVER	1
-4		32000-395		. TOP COVER	1
				(ATTACHING PARTS)	
		16440-375	MS35200-25	. SCREW	12
				---*---	
5			652	. PLUG (83330)	1
6		16860-011	2140-20-00	. LUG, Solder (78189)	1
7		32000-308	MT1248-060-1-15/32	. ENCLOSURE, 740 KHZ Oscillator (76561)	1
8		32000-309	MT1189-060-1-15/32	. ENCLOSURE, 240 and 500 KHZ Filters (76561)	2
9		32000-311	MT1047-040-1-15/32	. ENCLOSURE, Mixer (76561)	1
				(ATTACHING PARTS)	
		16321-375	MS51957-15	. SCREW	16
		16730-004	MS35337-78	. LOCKWASHER	16
				---*---	
10		36000-038		. CABLE ASSY	1
		15010-002	KC59-152	. . CONNECTOR, BNC Plug (91836)	1
11		15540-001	39016	. COUPLING, (76487)	4
				(ATTACHING PARTS)	
		16660-125	AN565DC6HZ	. SETSCREW (88044)	8
				---*---	
12		37000-162		. FRONT PANEL ASSY (see table 3-14 for breakdown)	1
				(ATTACHING PARTS)	
		16540-250	MS24693C46	. SCREW	6
				---*---	
13		32000-249-4		. SHAFT	1
14		32000-245		. BRACKET	2
				(ATTACHING PARTS)	
		16410-375	MS51957-28	. SCREW	4
		16730-006	MS35337-79	. LOCKWASHER	4
				---*---	
15		36000-015		. CABLE ASSY, Master Oscillator and Doubler Interconnecting	1
		15010-058	KC59-153	. . CONNECTOR, BNC Rt Angle (91836)	2

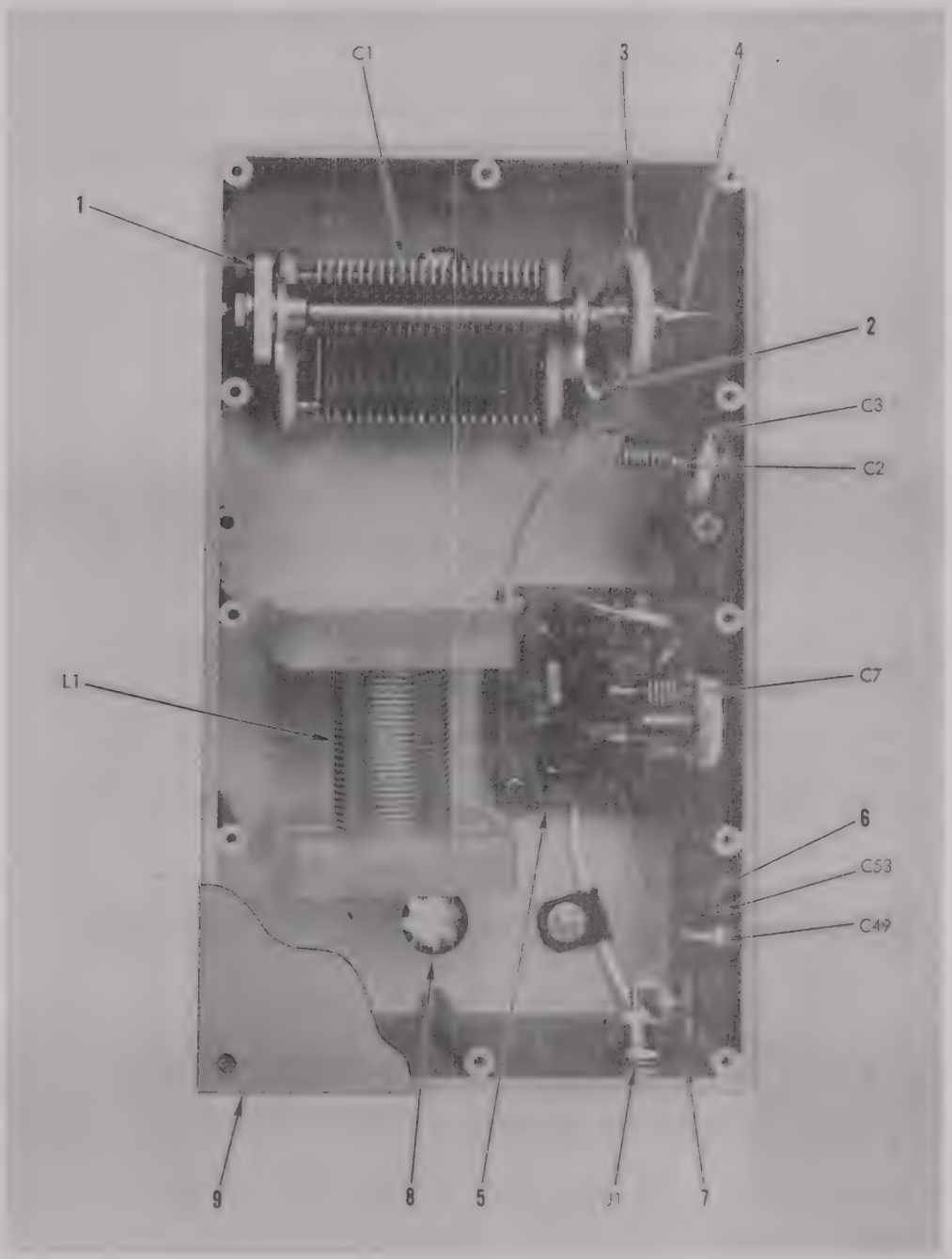


Figure 3-25. Master Oscillator Assembly

Table 3-7. Master Oscillator Assembly, Parts List

FIG. & INDEX NO.	REF DESIG	PART NUMBER		DESCRIPTION 1 2 3 4 5 6 7	QTY
		SYSTRON-DONNER	MFR		
3-25		37000-166		MASTER OSCILLATOR ASSY (see table 3-6 for next higher assy)	REF
	C1	11290-325	MC325M	. CAPACITOR, 325 PF (80583)	1
	C2	11290-150	MAC15	. CAPACITOR, 15 PF (80583)	1
	C3	11078-200	DM15-200J	. CAPACITOR, 20 PF (72136)	1
	C7	11290-250	MAPC25	. CAPACITOR, 25 PF (80583)	1
				(ATTACHING PARTS)	
		16321-312	MS51957-14	. SCREW	2
		16730-004	MS35337-78	. LOCKWASHER	2
				---*---	
	C49	11267-102	FB2B102W	. CAPACITOR, Feedthrough (01121)	1
	C53	11251-224	8131-100-651-224M	. CAPACITOR, 0.22 MFD (72982)	1
	J1	15050-000	KC79-35	. CONNECTOR, BNC (91836)	1
	L1	37000-167		. COIL ASSY	1
				(ATTACHING PARTS)	
		16410-375	MS51957-28	. SCREW	4
		16730-006	MS35337-79	. LOCKWASHER	4
				---*---	
1		32000-240		. BRACKET	1
				(ATTACHING PARTS)	
		16410-375	MS51957-28	. SCREW	2
		16730-006	MS35337-79	. LOCKWASHER	2
				---*---	
2				. LUG, Solder	1
				(ATTACHING PARTS)	
		32000-241		. SPACER	1
		16410-750	MS51957-32	. SCREW	1
		16730-006	MS35337-79	. LOCKWASHER	1
				---*---	
3		15540-001	39016	. COUPLING (76487)	1
				(ATTACHING PARTS)	
		16666-187	AN565DC6H2	. SETSCREW	4
				---*---	
4		32000-249-1		. SHAFT	1
-5		37000-088		. BOARD ASSY, Master Oscillator (see table 3-15 for breakdown)	1
				(ATTACHING PARTS)	
		15550-095	8401	. SPACER, Hex (83330)	4
		16740-004	MS15745-803	. WASHER	4
		16321-250	MS51957-13	. SCREW	8
		16730-804	MS35337-78	. LOCKWASHER	8
				---*---	
6				. LUG, Solder	1

Table 3-7. Master Oscillator Assembly, Parts List (Con't)

FIG. & INDEX NO.	REF DESIG	PART NUMBER		DESCRIPTION	QTY
		SYSTRON-DONNER	MFR	1 2 3 4 5 6 7	
3-25					
7		16860-011	2040-20-00	. LUG, Solder (78189)	1
8				. PLUG	2
9		32000-237		. COVER	
				(ATTACHING PARTS)	
		16321-312	MS51957-14	. SCREW	12
		16730-004	MS35337-78	. LOCKWASHER	12
				---*---	

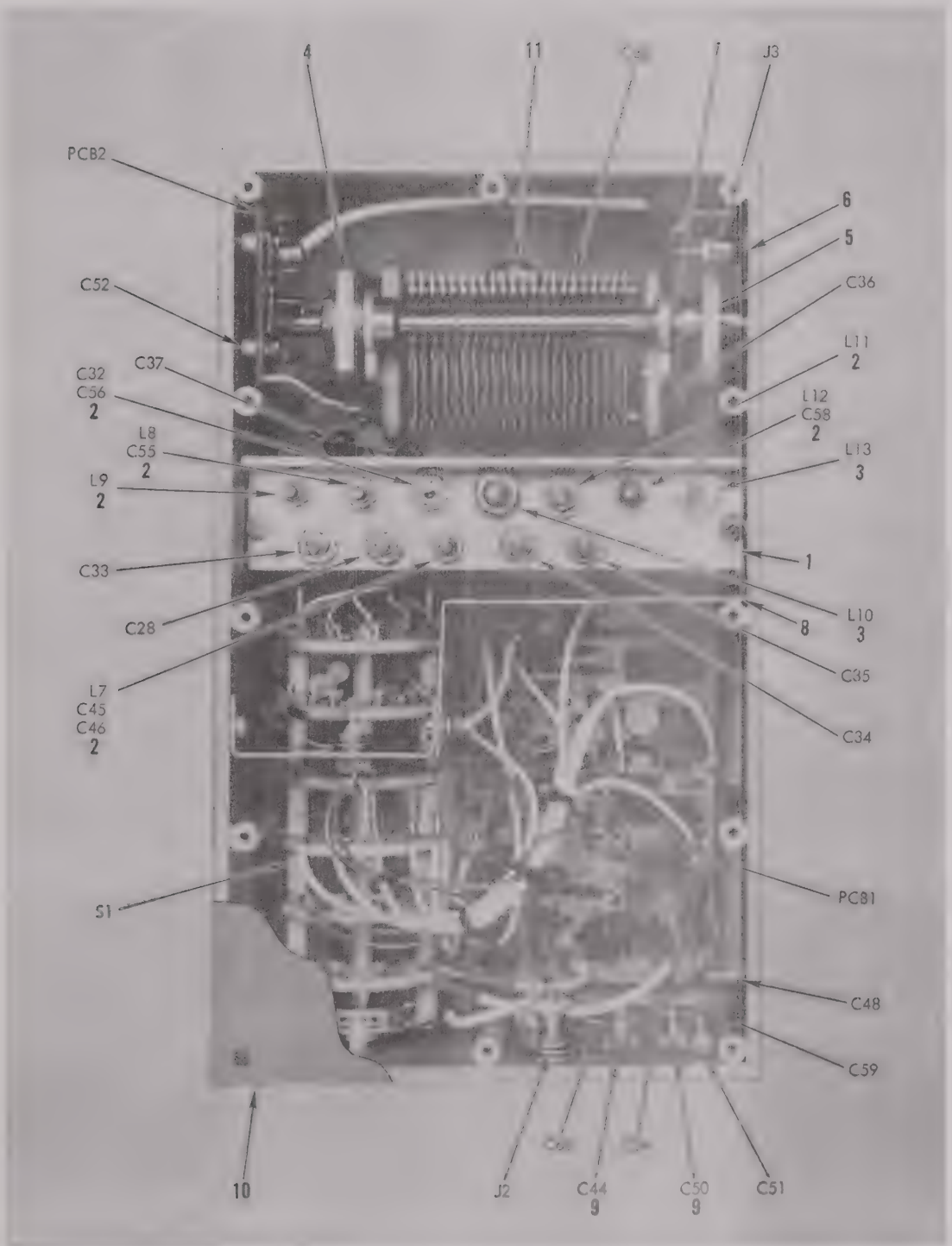


Figure 3-26. Doubler Divider Assembly

Table 3-8. Doubler Divider Assembly, Parts List

FIG. & INDEX NO.	REF DESIG	PART NUMBER		DESCRIPTION 1 2 3 4 5 6 7	QTY
		SYSTRON-DONNER	MFR		
3-26		37000-168		DOUBLER DIVIDER ASSY (see table 3-6 for next higher assy)	REF
1		37000-170		. CAPACITOR AND COIL MOUNTING ASSY (ATTACHING PARTS)	1
		16321-250	MS51957-13	. SCREW	2
		16730-004	MS35337-78	. LOCKWASHER	2
				---*---	
	C28, 32, 33, 34, 35	11307-009	VC26G	. . CAPACITOR, 0.9 - 9 PF (73899)	5
	C45	11077-102	DM15-102J	. . CAPACITOR, 1000 PF (72136)	1
	C46	11076-391	DM10-391J	. . CAPACITOR, 390 PF (72136)	1
	C55	11251-104	RED CAP	. . CAPACITOR, 0.1 MFD (72982)	1
	C56	11076-200	DM10-200J	. . CAPACITOR, 20 PF (72136)	1
	C58	11076-050	DM10-050J	. . CAPACITOR, 5 PF (72136)	1
	L7	14275-006		. . INDUCTOR, Modified (make from 4301) (96493)	1
	L8	14275-007	4501	. . INDUCTOR, 0.44-0.76 UH (96493)	1
	L9	14275-008	4503	. . INDUCTOR, 1.7 - 2.7 UH (96493)	1
	L10	14275-009	4406	. . INDUCTOR, 7.3 - 14 UH (96493)	1
	L11	14275-010		. . INDUCTOR, Modified (make from 4509) (96493)	1
	L12	14275-012	4512	. . INDUCTOR, 120 - 190 UH (96493)	1
	L13	14275-011	4412	. . INDUCTOR, 495 - 760 UH (96493)	1
2		16860-010	2101-10-04	. . LUG, Solder (78189)	6
3		16860-014	2168-14-01	. . LUG, Solder (78189)	2
	C36	11077-120	DM15-120J	. CAPACITOR, 12 PF (72136)	1
	C37	11077-341	DM15-341J	. CAPACITOR, 340 PF (72136) (ATTACHING PARTS)	1
		16780-019	4552A	. STANDOFF (94680)	1
		16321-250	MS51957-13	. SCREW	1
		16730-004	MS35337-78	. LOCKWASHER	1
				---*---	
	C38	11290-325	MC325M	. CAPACITOR, Variable (80583) (ATTACHING PARTS)	1
		32000-241		. SPACER	1
		16410-750	MS51957-32	. SCREW	1
		16730-006	MS35337-79	. LOCKWASHER	1
				---*---	
	C44, 48 50, 52	11267-102	FB1B102W	. CAPACITOR, Feedthrough, 0.001 MFD (01121)	4
	C51	11512-106	CS13BE106K	. CAPACITOR, 10 MFD	1
	C54, 59, 60	11251-104	8131-100-651-104M	. CAPACITOR, 0.1 MFD (72982)	3

Table 3-8. Doubler Divider Assembly, Parts List (Con't)

FIG. & INDEX NO.	REF DESIG	PART NUMBER		DESCRIPTION 1 2 3 4 5 6 7	QTY
		SYSTRON-DONNER	MFR		
3-26	J2	15050-000	KC79-35	. CONNECTOR, BNC (91836)	1
	J3	15050-001	KC79-75	. CONNECTOR, BNC, Right Angle (91836)	1
	PCB1	37000-096		. BOARD ASSY, Doubler Divider (see table 3-15 for breakdown)	1
				(ATTACHING PARTS)	
		15550-099	8404	. SPACER, Hex (83330)	4
			MS15795-803	. WASHER	4
		16321-312	MS51957-14	. SCREW	8
		16730-004	MS35337-78	. LOCKWASHER	8
				---*---	
	PCB2	37000-158		. BOARD ASSY, Driver (see table 3-15 for breakdown)	1
				(ATTACHING PARTS)	
		15550-095	8401	. SPACER, Hex (83330)	2
		16321-250	MS51957-13	. SCREW	2
		16321-312	MS51957-14	. SCREW	2
		16730-004	MS35337-78	. LOCKWASHER	4
			MS15795-803	. WASHER	2
	S1	37000-169		. SWITCH ASSY (see table 3-16 for breakdown)	1
4	32000-246			. BRACKET, Capacitor Mounting	1
				(ATTACHING PARTS)	
		16410-375	MS51957-28	. SCREW	2
		16730-006	MS35337-79	. LOCKWASHER	2
				---*---	
5		15540-001	39016	. COUPLING (76487)	1
				(ATTACHING PARTS)	
		16666-125	AN565DC6H2	. SETSCREW	4
				---*---	
6		16860-011	2040-20-00	. LUG, Solder (78189)	2
7		32000-249-5		. SHAFT	1
8		32000-322		. SHIELD	1
				(ATTACHING PARTS)	
		16321-312	MS51957-14	. SCREW	3
		16730-004	MS35337-78	. LOCKWASHER	3
				---*---	
9		16860-014	21-68-14-01	. LUG, Solder (78189)	3
10		32000-237		. COVER	1
				(ATTACHING PARTS)	
		16321-312	MS51957-14	. SCREW	12
		16730-004	MS35337-78	. LOCKWASHER	12
				---*--	
11		15420-000	654	. PLUG (83330)	2

Table 3-9. Self-Test Board Assembly, Parts List

FIG. & INDEX NO.	REF DESIG	PART NUMBER		DESCRIPTION 1 2 3 4 5 6 7	QTY
		SYSTRON-DONNER	MFR		
3-23	PCB301	37000-090		BOARD ASSY, Self Test Circuit (see table 3-6 for next higher assy)	REF
	C1, 3, 4, 7-9, 11, 12, 16-18 21	11251-104	8131-651-100-104M	. CAPACITOR, Disk, .1 MFD (72982)	12
	C2, 10, 15	11510-226	MTP226M015 P1A	. CAPACITOR, Tantalum, 22 MFD, 15 VDC (90201)	3
	C5, 13	11078-750	DM15-750F	. CAPACITOR, Mica, 75 PF, 1% (72136)	2
	C6, 14	11078-102	DM15-102F	. CAPACITOR, Mica, 1000 PF, 1% (72136)	2
	C19	11078-181	DM15-181F	. CAPACITOR, Mica, 180 PF, 1% (72136)	1
	C20, 23, 24	11078-432	DM15-432F	. CAPACITOR, Mica, 4300 PF, 1% (72136)	3
	C22, 25	11161-107	985-614E	. CAPACITOR, Tantalum, 100 MFD, 15V (83125)	2
	C26	11076-040	DM5CC040A	. CAPACITOR, Mica, 4 PF (72136)	1
	CR1	12164-002	IN914	. DIODE (80131)	1
	L1, 2	14275-003	9053	. INDUCTOR, Variable, 14-28 uh (96493)	2
	L3	14275-004	9057	. INDUCTOR, Variable, .280-.650 uh (96493)	1
	Q1, 2, 3	12695-004	2N1711	. TRANSISTOR (01295)	3
	Q4	12605-015	2N3906	. TRANSISTOR (04713)	1
	Q5, 6	12645-014	2N3391A	. TRANSISTOR (03508)	2
	R1, 12	10010-102	RC07GF102J	. RESISTOR, 1K, 1/4W, 5%	2
	R2, 11, 13	10010-101	RC07GF101J	. RESISTOR, 100 ohms, 1/4W, 5%	3
	R3, 4, 5 26, 28, 29	10010-122	RC07GF122J	. RESISTOR, 1.2K, 1/4W, 5%	6
	R6, 27	10010-181	RC07GF181J	. RESISTOR, 181 ohms, 1/4W, 5%	2
	R7, 9	10010-221	RC07GF221J	. RESISTOR, 220 ohms, 1/4W, 5%	2
	R8, 10	10431-201	66WR200	. RESISTOR, Variable, 200 ohms (73138)	2
	R14	10010-103	RC07GF103J	. RESISTOR, 10K, 1/4W, 5%	1
	R15, 17	10010-203	RC07GF203J	. RESISTOR, 20K, 1/4W, 5%	2
	R16	10010-512	RC07GF512J	. RESISTOR, 5.1K, 1/4W, 5%	1
	R18	10010-510	RC07GF510J	. RESISTOR, 51 ohms, 1/4W, 5%	1
	R19, 23	10711-001	RN60D1001F	. RESISTOR, 1K, 1/4W, 1%	2
	R20	10713-922	RN60D3922F	. RESISTOR, 39.2K, 1/4W, 1%	1
	R21	10431-103	66WR10K	. RESISTOR, Variable, 10K (73138)	1
	R22	10713-012	RN60D3012F	. RESISTOR, 30.1K, 1/4W, 1%	1

Table 3-9. Self-Test Board Assembly, Parts List (Con't)

FIG. & INDEX NO.	REF DESIG	PART NUMBER		DESCRIPTION	QTY
		SYSTRON-DONNER	MFR	1 2 3 4 5 6 7	
3-23	R24	10711-301	RN60D1301F	. RESISTOR, 1.30K, 1/4W, 1%	1
	R25	10716-041	RN60D6041F	. RESISTOR, 6.04K, 1/4W, 1%	1
	R30	10010-822	RC07GF822J	. RESISTOR, 8.2K, 1/4W, 5%	1
	X1	19050-003	CL19 3MHZ	. CRYSTAL, 3.000 MHZ (12603)	1
	X2	19050-004	CL19 3002K	. CRYSTAL, 3.002 MHZ (12603)	1
	X3	19050-006	CL25 500 KHZ	. CRYSTAL, 500.000 KHZ (12603)	1
	Z1, 2, 3	12901-006	U5B770339	. INTEGRATED CIRCUIT, M703C (07263)	3

Table 3-10. 740 kHz Oscillator Board Assembly, Parts List

FIG. & INDEX NO.	REF DESIG	PART NUMBER		DESCRIPTION 1 2 3 4 5 6 7	QTY
		SYSTRON-DONNER	MFR		
3-21		37000-091		BOARD ASSY, 740 KHZ Oscillator Mixer (see table 3-6 for next higher assy)	REF
	C1,9,10,16	11150-106	984-603B	. CAPACITOR, 10 MFD, 15V (83125)	4
	C2,11,14 19,20,15	11251-104	8131-100-6510 104M	. CAPACITOR, .1 MFD, 100V (72982)	6
	C3,4	11251-334	8131-100-651-334M	. CAPACITOR, .33 MFD, 100V (72982)	2
	C5	11510-226	MTP226M015 P1A	. CAPACITOR, 22 MFD, 15V (90201)	1
	C6,7	11078-131	DM10-131F	. CAPACITOR, 130 PF, 1% (72136)	2
	C8	11161-506	985-579C	. CAPACITOR, 50 MFD, 15V (83125)	1
	C12	11076-680	DM10-680J	. CAPACITOR, 68 PF, 5% (72136)	1
	C13,24	11077-202	DM19-202J	. CAPACITOR, 2000 PF, 5% (72136)	2
	C17	11309-600	538-011F-15-60	. CAPACITOR, Variable, 15-60 PF (72982)	1
	C18	11076-151	DM15-151J	. CAPACITOR, 150 PF, 5% (72136)	1
	C21		CK05BX272K	. CAPACITOR, 2700 PF, 10%	1
	C22	11076-751	DM15-751J	. CAPACITOR, 750 PF, 5% (72136)	1
	C23		CK05BX103K	. CAPACITOR, 0.01 MFD, 10%	1
	C25		CK05BX682K	. CAPACITOR, 6800 PF, 10%	1
	CR1	12154-201	IN935	. DIODE (80131)	1
	CR2,3	12164-006	IN456A	. DIODE (80131)	2
	CR4	12154-200	IN821	. DIODE (80131)	1
	CR5-8	12164-002	IN914	. DIODE (80131)	4
	L1	14275-005	9057	. INDUCTOR, Variable, 280u-650uh (96493)	1
	L2		9310-40	. INDUCTOR, 15 uh	1
	L3		9053	. INDUCTOR, Variable, 14-20 uh (96493)	1
	Q1,2	12695-008	2N708	. TRANSISTOR	2
	Q3,4	12695-004	2N1711	. TRANSISTOR	2
	R1,12,13	10711-001	RN60D1001F	. RESISTOR, 1K, 1/4W, 1%	3
	R2,27	10431-102	66WR1K	. RESISTOR, Variable, 1K (73138)	2
	R3	10431-103	66WR10K	. RESISTOR, Variable, 10K (73138)	1
	R4	10714-752	RN60D4752F	. RESISTOR, 47.5K, 1/4W, 1%	1
	R5	10713-322	RN60D3322F	. RESISTOR, 33.2K, 1/4W, 1%	1
	R6	10711-003	RN60D1003F	. RESISTOR, 100K, 1/4W, 1%	1
	R7	10010-151	RC07GF151J	. RESISTOR, 150, 1/4W, 5%	1
	R8,18,20,29	10010-101	RC07GF101J	. RESISTOR, 100, 1/4W, 5%	4
	R9	10010-242	RC07GF242J	. RESISTOR, 2400, 1/4W, 5%	1
	R10-15	10010-331	RC07GF331J	. RESISTOR, 330, 1/4W, 5%	2

Table 3-10. 740 kHz Oscillator Board Assembly, Parts List (Con't)

FIG. & INDEX NO.	REF DESIG	PART NUMBER		DESCRIPTION	QTY
		SYSTRON-DONNER	MFR	1 2 3 4 5 6 7	
3-21	R11,14	10719-091	RN60D9091F	. RESISTOR, 9.09K, 1/4W, 1%	2
	R16	10010-283	RC07GF283J	. RESISTOR, 28K, 1/4W, 5%	1
	R17	10010-432	RC07GF432J	. RESISTOR, 4300, 1/4W, 5%	1
	R19	10010-102	RC07GF102J	. RESISTOR, 1000, 1/4W, 5%	1
	R21	10010-113	RC07GF112J	. RESISTOR, 1100, 1/4W, 5%	1
	R22	10711-002	RN60D1002F	. RESISTOR, 10K, 1/4W, 1%	1
	R23	10010-223	RC07GF223J	. RESISTOR, 22K, 1/4W, 5%	1
	R24	10715-111	RN60D5111F	. RESISTOR, 5.11K, 1/4W, 1%	1
	R25,30	10711-821	RN60D1821F	. RESISTOR, 1.82K, 1/4W, 1%	2
	R26	10714-751	RN60D4751F	. RESISTOR, 4.75K, 1/4W, 1%	1
	R28	10010-470	RC07GF470J	. RESISTOR, 47, 1/4W, 5%	1
	R31	10010-181	RC07GF181J	. RESISTOR, 180, 1/4W, 5%	1
	T1	30000-021		. TRANSFORMER (01220)	1
	T2	30000-022		. TRANSFORMER (01220)	1
	X1	19050-005	CL25 740KHZ	. CRYSTAL, 740 KHZ (12603)	1
	Z1	12901-007	CA3047	. INTEGRATED CIRCUIT (02735)	1
	Z2	12901-006	MA703C	. INTEGRATED CIRCUIT (07263)	1

Table 3-11. 240 kHz Filter Board Assembly, Parts List

FIG. & INDEX NO.	REF DESIG	PART NUMBER		DESCRIPTION 1 2 3 4 5 6 7	QTY
		SYSTRON-DONNER	MFR		
3-22	PCB305	37000-092		BOARD ASSY, 240 KHZ Filter - Amplifier (see table 3-6 for next higher assy)	REF
	C1	11092-663	PC.066	. CAPACITOR, .066 MFD, 50V (02799)	1
	C2	11078-981	DM15-981F	. CAPACITOR, 980 PF, 1% (72136)	1
	C3	11092-244	PC.246	. CAPACITOR, .246 MFD, 1% (02799)	1
	C4	11078-721	DM15-721F	. CAPACITOR, 720 PF, 1% (72136)	1
	C5	11092-184	PC.18	. CAPACITOR, .18 MFD, 1% (02799)	1
	C6	11078-252	DM19-252F	. CAPACITOR, 2500 PF, 1% (72136)	1
	C7	11510-226	MTP226M015 P1A	. CAPACITOR, 22 MFD, 15V (37942)	1
	C8	11078-181	DM15-181F	. CAPACITOR, 180 PF, 1% (72136)	1
	C9,11	11251-104	8131-100-651-104M	. CAPACITOR, .1 MFD, 100V (72982)	2
	C10	11150-106	984-603B	. CAPACITOR, 10 MFD, 15V (83125)	1
	L1	30000-023		. INDUCTOR (01220)	1
	L2	30000-024		. INDUCTOR (01220)	1
	L3	30000-025		. INDUCTOR (01220)	1
	L4	30000-026		. INDUCTOR (01220)	1
	L5	30000-027		. INDUCTOR (01220)	1
	L6	30000-028		. INDUCTOR (01220)	1
	L7	14254-247	9220-46	. INDUCTOR (96493)	1
	Q1	12715-000	2N5163	. TRANSISTOR (07263)	1
	Q2	12695-004	2N1711	. TRANSISTOR	1
	R1	10715-111	RN60D5111F	. RESISTOR, 5.11K, 1/4W, 1%	1
	R2	10431-102	66WR1K	. RESISTOR, Variable, 1K, Trimpot (73138)	1
	R3,7	10010-101	RC07GF101J	. RESISTOR, 100, 1/4W, 5%	2
	R4,5	10711-102	RN60D1102F	. RESISTOR, 11K, 1/4W, 1%	2
	R6	10010-112	RC07GF112J	. RESISTOR, 1100, 1/4W, 5%	1
	T1	30000-029		. TRANSFORMER	1

Table 3-12. 500 kHz Filter Board Assembly, Parts List

FIG. & INDEX NO.	REF DESIG	PART NUMBER		DESCRIPTION 1 2 3 4 5 6 7	QTY
		SYSTRON-DONNER	MFR		
3-20		37000-093		BOARD ASSY, 500 KHZ Filter-Amplifier (see table 3-6 for next higher assy)	REF
	C1,5	10092-133	PC.0136	. CAPACITOR, Tantalum, .0136 MFD (02799)	2
	C2,4	11078-122	DM19-122F	. CAPACITOR, Mica, 1200 PF, 1% (72136)	2
	C3	11092-043	PC.044	. CAPACITOR, Tantalum, .044 MFD (02799)	1
	C6	11150-106	984603B	. CAPACITOR, Tantalum, 10 MFD (83125)	1
	C7,8,10, 11	11251-104	8131-100-651-104M	. CAPACITOR, Disk, .1 MFD (72982)	4
	C9	11243-203	TGS20	. CAPACITOR, .02 MFD (56289)	1
	L1	30000-038		. INDUCTOR, Variable, 7.5 uh(01220)	1
	L2,4	30000-039		. INDUCTOR, Variable, 89 uh (01220)	2
	L3	30000-040		. INDUCTOR, Variable, 2.3 uh (01220)	1
	L5	30000-043		. INDUCTOR, Variable, 4 uh (01220)	1
	L6	14244-005	9350-44	. INDUCTOR, 10 MH (96493)	1
	Q1	12715-007	40673	. TRANSISTOR (02735)	1
	Q2	12695-004	2N1711	. TRANSISTOR	1
	R1	10715-111	RN60D5111F	. RESISTOR, 5.11K, 1/4W, 1%	1
	R2	10714-752	RN60D4752F	. RESISTOR, 47.5K, 1/4W, 1%	1
	R3	10714-751	RN60D4751F	. RESISTOR, 4.75K, 1/4W, 1%	1
	R4,R5	10712-672	RN60D2672F	. RESISTOR, 26.7K, 1/4W, 1%	2
	R6	10692-740	RN55D2740F	. RESISTOR, 274, 1/4W, 1%	1
	R7	10010-102	RC07GF102J	. RESISTOR, 1000, 1/4W, 5%	1
	R8	10010-101	RC07GF101J	. RESISTOR, 100, 1/4W, 5%	1
	R9,10	10010-103	RC07GF103J	. RESISTOR, 10K, 1/4W, 5%	2
	R11	10716-040	RN55D6040F	. RESISTOR, 604, 1/4W, 1%	1
	R12	10714-759	RN55D47R5F	. RESISTOR, 47.5, 1/4W, 1%	1
	R13	10010-300	RC07GF300J	. RESISTOR, 30, 1/4W, 5%	1
	T1	30000-029		. TRANSFORMER	1

Table 3-13. Mixer-AGC Board Assembly, Parts List

FIG. & INDEX NO.	REF DESIG	PART NUMBER		DESCRIPTION 1 2 3 4 5 6 7	QTY
		SYSTRON-DONNER	MFR		
3-18	PCB307	37000-089		BOARD ASSY, Mixer - AGC (see table 3-6 for next higher assy)	REF
	AR1	12901-008	MC1552G	. INTEGRATED CIRCUIT (04713)	1
	AR2	19040-000	M6A	. MIXER (27956)	1
	AR3	12901-002	V5B7741393	. INTEGRATED CIRCUIT (07263)	1
	C1, 3, 5, 7, 9, 12	11243-103	TGS10	. CAPACITOR, Disk, .01 uf (56289)	8
	C2, C13	11512-105	CS13BF105K	. CAPACITOR, Tantalum, 1 MFD	2
	C4, 14, 15	11251-104	8131-100-651-104M	. CAPACITOR, Disk, .1 MFD (72982)	3
	C6	11512-186	CS13BD186K	. CAPACITOR, Tantalum, 18 MFD	1
	C8	11078-182	DM19-182F	. CAPACITOR, Mica, 1800 PF, 1% (72136)	1
	CR1	12154-006	IN754A	. DIODE (80131)	1
	CR2	12224-001	HPA2900	. DIODE (28480)	1
	Q1, Q3	12695-008	2N708	. TRANSISTOR	2
	Q2	12695-004	2N1711	. TRANSISTOR	1
	R1, R15	10010-102	RC07GF102J	. RESISTOR, 1/4W, 5%, 1K	2
	R2	10010-301	RC07GF301J	. RESISTOR, 1/4W, 5%, 300 ohms	1
	R3, R12	10010-221	RC07GF221J	. RESISTOR, 1/4W, 5%, 220 ohms	2
	R4	10010-202	RC07GF202J	. RESISTOR, 1/4W, 5%, 2K	1
	R5, 19, 24	10010-471	RC07GF471J	. RESISTOR, 1/4W, 5%, 470 ohms	3
	R6, 18	10010-510	RC07GF510J	. RESISTOR, 1/4W, 5%, 51 ohms	2
	R7, 10, 13, 21, 22	10010-103	RC07GF103J	. RESISTOR, 1/4W, 5%, 10K	5
	R8	10714-022	RN60D4022F	. RESISTOR, 1/4W, 1%, 40.2K	1
	R9, 16	10010-101	RC07GF101J	. RESISTOR, 1/4W, 5%, 100 ohms	2
	R11	10010-752	RC07GF752J	. RESISTOR, 1/4W, 5%, 7.5K	1
	R14	10431-201	66WR200	. RESISTOR, Variable, 200 ohms (73138)	1
	R17	10010-502	RC07GF512J	. RESISTOR, 1/4W, 5%, 5.1K	1
	R20	10010-820	RC07GF820J	. RESISTOR, 1/4W, 5%, 82 ohms	1
	R23	10010-270	RC07GF270J	. RESISTOR, 1/4W, 5%, 27 ohms	1
	T1	14134-000	50600H	. TRANSFORMER (28480)	1

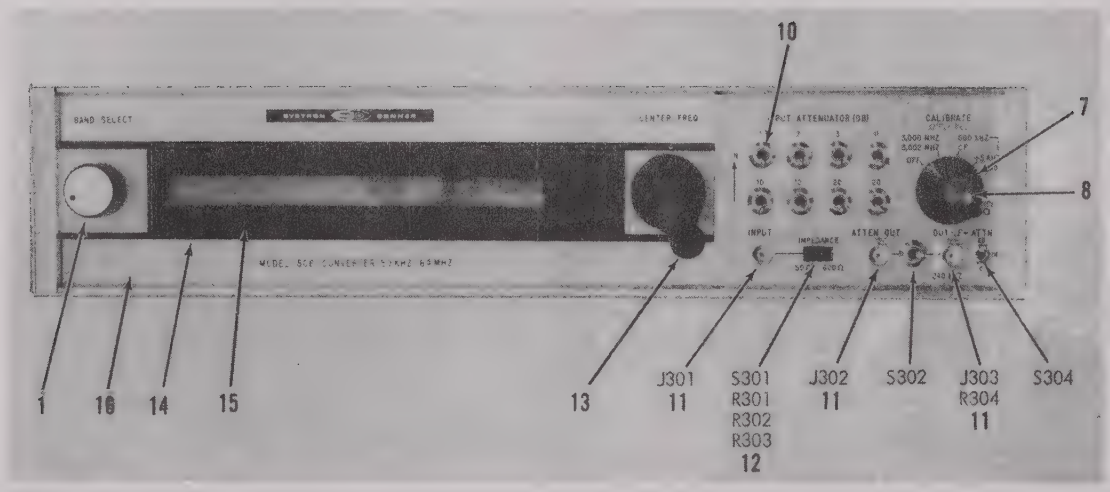


Figure 3-27. Front Panel Assembly

Table 3-14. Front Panel Assembly, Parts List

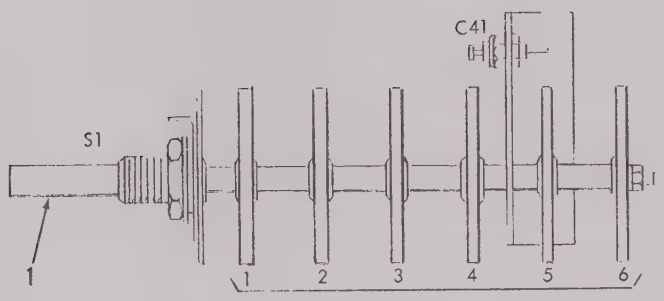
FIG. & INDEX NO.	REF DESIG	PART NUMBER		DESCRIPTION	QTY
		SYSTRON-DONNER	MFR	1 2 3 4 5 6 7	
3-27		37000-162		FRONT PANEL ASSY, Converter (see table 3-6 for next higher assy)	REF
	AT301	37000-164		. ATTENUATOR ASSY (see table 3-17 for breakdown)	1
	J301-303	15050-000	KC79-35	. CONNECTOR, BNC (91836)	3
	R301	10695-259	RN55D52R5F	. RESISTOR, 52.5, 1/4W, 1%	1
	R302	10695-760	RN55D5760F	. RESISTOR, 576, 1/4W, 1%	1
	R303	10010-511	RC07GF511J	. RESISTOR, 510, 1/4W, 5%	1
	R304	10010-181	RC07GF181J	. RESISTOR, 180, 1/4W, 5%	1
	S301	15310-002	518	. SWITCH, Impedance (83330)	1
				(ATTACHING PARTS)	
			1480C	. STANDOFF (94680)	
		16730-004	MS35337-78	. LOCKWASHER (96906)	1
				---*---	
	S302, 306	15280-019	MST205N	. SWITCH (95146)	2
	S303	25250-017		. SWITCH, Rotary	1
1		15400-052	DS90-1-2G	. KNOB (49956)	1
2		32000-324		. SPACER	1
3		37000-163		. DIAL ASSY	1
4		15540-001	39016	. COUPLING (76487)	1
				(ATTACHING PARTS)	
		16660-125	AN565DC6H2	. SETSCREW (88044)	2
				---*---	
5		37000-136		. GEAR DRIVE ASSY	1
6		36000-017		. CABLE ASSY	2
		15010-004	KC59-123	. . CONNECTOR, BNC Plug (91836)	1
7		15400-045	70B3CB2G	. KNOB, Outer Shaft (49956)	1
8		15400-046	R50-1WD1G	. KNOB Inner Shaft (49956)	1
9		15540-002	4511/DARV	. BALL DRIVE ( )	1
10			N3	. NUT, Decorative (95146)	9
11		16860-108		. LUG, Solder	3
12		16861-004		. LUG, Solder	1
				(ATTACHING PARTS)	
		16321-188	MS51957-12	. SCREW	1
		16740-004	MS14794-803	. WASHER	1
				---*---	
13		15400-053	MS91528-3S2B	. KNOB (96906)	1
14		32000-318		. BEZEL	1
15		32000-313		. MASK	1
16		32000-255		. PANEL	1

Table 3-15. Master Oscillator and Doubler Divider Circuit Boards, Parts List

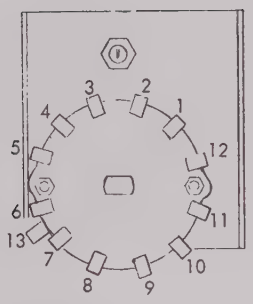
FIG. & INDEX NO.	REF DESIG	PART NUMBER		DESCRIPTION 1 2 3 4 5 6 7	QTY
		SYSTRON-DONNER	MFR		
3-19				CIRCUIT BOARDS, Master Oscillator and Double Divider (see noted table for next higher assy)	REF
		37000-088		. BOARD ASSY, Master Oscillator (see table 3-7)	REF
	C4,5	11078-681	DM15-681F	. . CAPACITOR, 680 PF, 1% (72136)	2
	C6,10	11251-104	8131-100-651-104M	. . CAPACITOR, 0.1 MFD, 100V (72982)	2
	C8	11077-020	DM10-010	. . CAPACITOR, 2 PF (72136)	1
	C9	11077-120	DM15-120J	. . CAPACITOR, 12 PF, 5% (72136)	1
	C11	11077-331	DM15-331J	. . CAPACITOR, 330 PF, 5% (72136)	1
	C12	11243-103	TG510	. . CAPACITOR, 0.01 MFD, 100V (58289)	1
	L2	14284-470	WEE470	. . INDUCTOR, 470 MH (43543)	1
	L3	14284-100	WEE100	. . INDUCTOR, 100 MH (43543)	1
	Q1,2	12715-000	T1S58(GREEN)	. . TRANSISTOR (01295)	2
	R3	10010-102	RC07GF102J	. . RESISTOR, 1000, 1/4W, 5%	1
	R4	10010-221	RC07GF221J	. . RESISTOR, 220, 1/4W, 5%	1
	R5	10010-104	RC07GF104J	. . RESISTOR, 100K, 1/4W, 5%	1
	R6	10010-101	RC07GF101J	. . RESISTOR, 100, 1/4W, 5%	1
	R7	10010-151	RC07GF151J	. . RESISTOR, 150, 1/4W, 5%	1
	PCB1	37000-096		. BOARD ASSY, Doubler Divider (see table 3-8 for next higher assy)	REF
	C13,14, 17,21, 24,30	11251-104	8131-100-651-104M	. . CAPACITOR, 0.1 MFD, 100V (72982)	6
	C15,20	11077-271	DM15-271J	. . CAPACITOR, 270 PF, 5% (72136)	2
	C16	11243-103	805-000X5Y0-1032	. . CAPACITOR, 0.01 MFD (72982)	1
	C19	11078-681	DM15-681F	. . CAPACITOR, 680 PF, 1% (72136)	1
	C23	11077-221	DM15-221J	. . CAPACITOR, 220 PF, 5% (72136)	1
	C26	11077-511	DM15-511J	. . CAPACITOR, 510 PF, 5% (72136)	1
	C27	11077-330	DM15-330J	. . CAPACITOR, 33 PF, 5% (72136)	1
	C42,43, 47	11077-102	DM19-102J	. . CAPACITOR, 1000 PF, 5% (72136)	1
	CR1-6	12144-004	1N270	. . DIODE (80131)	6
	Q3	12695-004	2N1711	. . TRANSISTOR	1
	Q4-7	12695-008	2N708	. . TRANSISTOR	4
	R8	10010-152	RC07GF152J	. . RESISTOR, 1500, 1/4W, 5%	1
	R9	10010-471	RC07GF471J	. . RESISTOR, 470, 1/4W, 5%	1
	R10,32 33,38	10010-102	RC07GF102J	. . RESISTOR, 1000, 1/4W, 5%	4
	R11,30, 36,41,42	10010-101	RC07GF101J	. . RESISTOR, 100, 1/4W, 5%	5

Table 3-15. Master Oscillator and Doubler Divider Circuit Boards, Parts List (Con't)

FIG. & INDEX NO.	REF DESIG	PART NUMBER		DESCRIPTION 1 2 3 4 5 6 7	QTY
		SYSTRON-DONNER	MFR		
3-19	R14,56	10010-332	RC07GF332J	. . RESISTOR, 3300, 1/4W, 5%	2
	R15,35	10010-511	RC07GF511J	. . RESISTOR, 510, 1/4W, 5%	2
	R16,24, 26	10010-103	RC07GF103J	. . RESISTOR, 10K, 1/4W, 5%	3
	R17	10010-202	RC07GF202J	. . RESISTOR, 2000, 1/4W, 5%	1
	R18	10010-112	RC07GF112J	. . RESISTOR, 1100, 1/4W, 5%	1
	R19	10010-822	RC07GF822J	. . RESISTOR, 8200, 1/4W, 5%	1
	R20,23	10010-512	RC07GF512J	. . RESISTOR, 5100, 1/4W, 5%	2
	R21	10010-331	RC07GF331J	. . RESISTOR, 330, 1/4W, 5%	1
	R22	10010-222	RC07GF222J	. . RESISTOR, 2200, 1/4W, 5%	1
	R25,31	10010-751	RC07GF751J	. . RESISTOR, 750, 1/4W, 5%	2
	R27,43, 48	10010-431	RC07GF431J	. . RESISTOR, 430, 1/4W, 5%	3
	R34,40 45,46,49	10010-470	RC07GF470J	. . RESISTOR, 47, 1/4W, 5%	5
	R37	10010-752	RC07GF752J	. . RESISTOR, 7500, 1/4W, 5%	1
	R47	10010-362	RC07GF362J	. . RESISTOR, 3600, 1/4W, 5%	1
	T1	30000-035		. . TRANSFORMER	1
	T2	30000-036		. . TRANSFORMER	1
	T3	30000-037		. . TRANSFORMER	1
	Z1	12901-003	U5B771039X	. . INTEGRATED CIRCUIT (07263)	1
	Z2,3	12901-009	MC876P	. . INTEGRATED CIRCUIT (04713)	2
	PCB2	37000-158		. BOARD ASSY, Driver (see table 3-8 for next higher assy)	REF
	C31,40	11251-104	8131-100-651-104M	. . CAPACITOR, 0.1 PF (72982)	2
	C37	11077-361	DM15-361J	. . CAPACITOR, 360 PF (72136)	1
	C39	11077-101	DM15-010M	. . CAPACITOR, 1 PF (72136)	1
	Q8	12715-005	2N5248	. . TRANSISTOR	1
	Q9	12695-008	2N708	. . TRANSISTOR	1
	R52	10010-101	RC07GF101J	. . RESISTOR, 100, 1/4W, 5%	1
	R53,54	10010-335	RC07GF335J	. . RESISTOR, 3.3 Meg, 1/4W, 5%	2
	R55	10010-202	RC07GF202J	. . RESISTOR, 2000, 1/4W, 5%	1
	R58	10010-220	RC07GF220J	. . RESISTOR, 22, 1/4W, 5%	1
	R59	10010-102	RC07GF102J	. . RESISTOR, 1000, 1/4W, 5%	1



SWITCH SECTIONS



TYPICAL SWITCH SECTION TERMINAL IDENTIFICATION. VIEW FROM REAR END.

COMPONENT	FROM	TO
C29	S1-5-13	S1-6-7
C57	S1-5-12	GROUND LUG
L4	S1-5-1	S1-5-10
L5	S1-5-2	S1-5-10
L6	S1-5-4	S1-5-9
L14	S1-5-3	S1-5-9
L15	S1-5-5	S1-5-8
R12	S1-5-9	S1-6-9
R13	S1-5-3	S1-5-9
R50	S1-5-4	S1-5-8
R51	C41	S1-5-12
R56	S1-5-5	S1-5-8

NOTES: 1. C41 MOUNTED ON SHIELD.

2. FIRST DASH NUMBER AFTER SWITCH DESIGNATION IDENTIFIES SWITCH SECTION, SECOND DASH NUMBER IDENTIFIES TERMINAL POSITION IN RESPECTIVE SECTION.

Figure 3-28. Doubler Divider Switch Assembly

Table 3-16. Doubler Divider Switch Assembly, Parts List

FIG. & INDEX NO.	REF DESIG	PART NUMBER		DESCRIPTION 1 2 3 4 5 6 7	QTY
		SYSTRON-DONNER	MFR		
3-28	S1-2	37000-169		SWITCH ASSY, Double Divider (see table 3-8 for next higher assy)	REF
	C29	11078-050	DM15-050F	. CAPACITOR, 5 PF (72136)	1
	C41	11267-102	FB2B-102W	. CAPACITOR, Feed Thru, .001 uf (01121)	1
	C57	11251-104	8131-100-651-104M	. CAPACITOR, .1 MF (72982)	1
	L4	14254-225	9220-44	. INDUCTOR, 2.2 mh (96493)	1
	L5	14254-621	9220-18	. INDUCTOR, 620 uh (96493)	1
	L6	14254-330	9310-52	. INDUCTOR, 33 uh (96493)	1
	L14	14254-181	9210-88	. INDUCTOR, 180 uh (96493)	1
	L15	14254-060	9310-30	. INDUCTOR, 5.6 uh (96493)	1
	R12	10010-221	RC07GF221J	. RESISTOR, 220, 1/4W, 5%	1
	R13,50	10010-102	RC07GF102J	. RESISTOR, 1000, 1/4W, 5%	2
	R51	10010-101	RC07GF101J	. RESISTOR, 100, 1/4W, 5%	1
	R56	10010-470	RC07GF470J	. RESISTOR, 47, 1/4W, 5%	1
1		25260-004		. SWITCH, Modified (make from 15260-001) (01220)	1 1

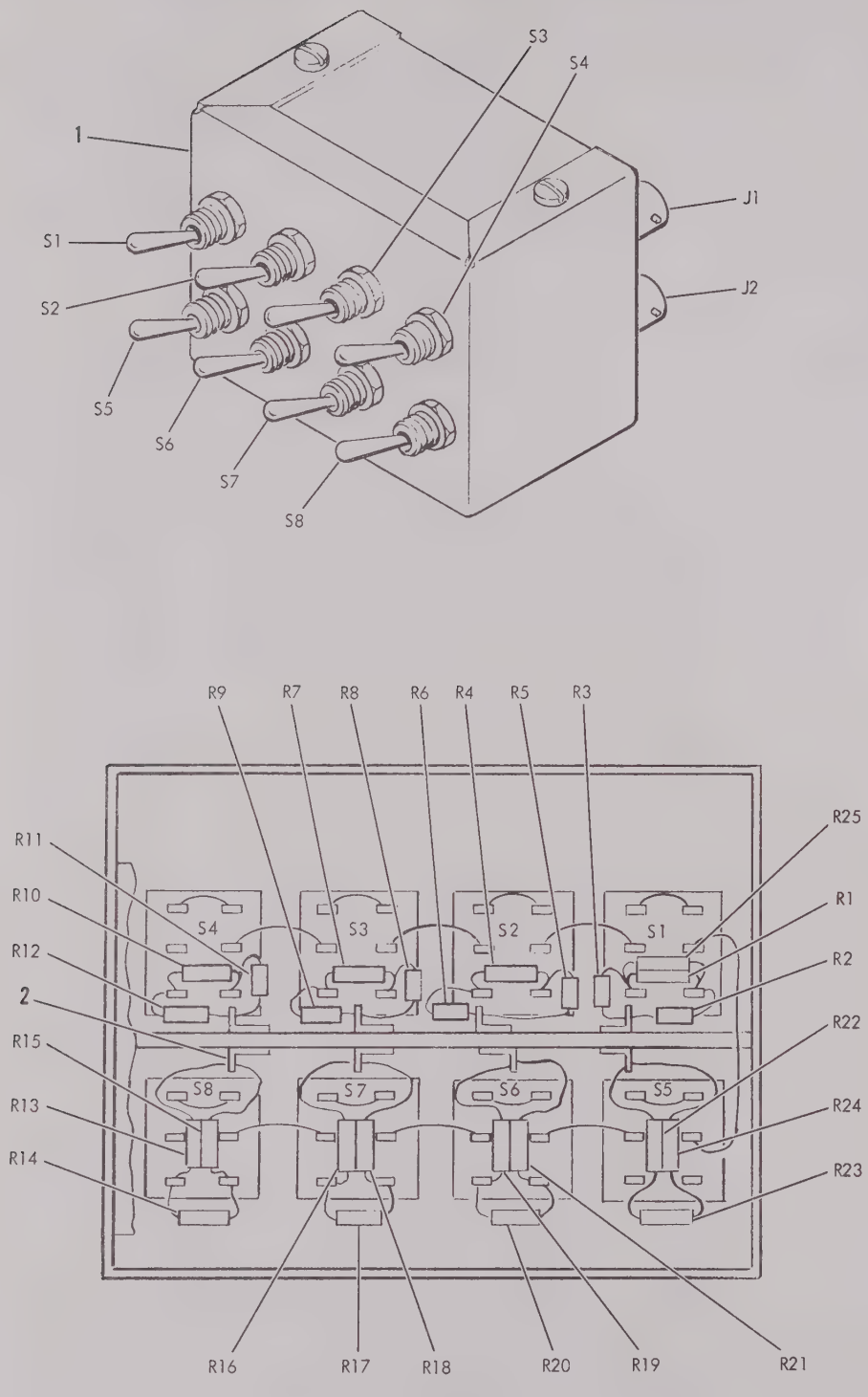


Figure 3-29. Attenuator Assembly

Table 3-17. Attenuator Assembly, Parts List

FIG. & INDEX NO.	REF DESIG	PART NUMBER		DESCRIPTION 1 2 3 4 5 6 7	QTY
		SYSTRON-DONNER	MFR		
3-29	AT301	37000-164		ATTENUATOR ASSY (see table 3-14 for next higher assy)	REF
	J1,2	15050-000	KC79-35	. CONNECTOR, BNC (91836)	2
	R1,4, 25	10691-159	RN55D11R5F	. RESISTOR, 11.5, 1/4W, 1%	3
	R2,3	10698-660	RN55D8660F	. RESISTOR, 866, 1/4W, 1%	2
	R5,6	10694-320	RN55D4320F	. RESISTOR, 432, 1/4W, 1%	2
	R7	10691-789	RN55D17R8F	. RESISTOR, 17.8, 1/4W, 1%	1
	R8,9	10692-930	RN55D2940F	. RESISTOR, 194, 1/4W, 1%	2
	R10	10693-749	RN55D37R4F	. RESISTOR, 37.4, 1/4W, 1%	1
	R11,12	10691-500	RN55D1500F	. RESISTOR, 150, 1/4W, 1%	2
	R13,15 16,18	10696-039	RN55D60R4F	. RESISTOR, 60.4, 1/4W, 1%	4
	R14,17	10692-490	RN55D2490F	. RESISTOR, 249, 1/4W, 1%	2
	R19,21 22,24	10699-539	RN55D95R3F	. RESISTOR, 95.3, 1/4W, 1%	4
	R20,23	10697-159	RN55D71R5F	. RESISTOR, 71.5, 1/4W, 1%	2
	S1-8	15280-019	MST205N	. SWITCH (95146)	8
1		32000-262		. COVER	1
				(ATTACHING PARTS)	
		16321-250	MS51957-13	. SCREW	4
		16710-004	4-40	. NUT, Keps (85605)	4
				---*---	
2		1680-005	597	. LUG, Solder (79963)	8
				(ATTACHING PARTS)	
		16321-250	MS51957-13	. SCREW	8
		16710-004	4-40	. NUT, Keps (85605)	8
				---*---	

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